Name of Institute: Institute of Engineering and Technology
Name of Faculty: Prof.Bhumi M Shah

Course code: CS0601
Course name: Software Engineering & Project Management
Pres-requisites: Object Oriented Programming Fundamentals
Credit points: 4
Offered Semester: VI

Course coordinator
Full name: Prof. Bhumi M Shah
Department with siting location:CE Department,3rd Floor,Staff Room,Bhanvar Building
Telephone:-NA
Email:bhumishah.ce@indusuni.ac.in
Consultation times: Thursday: 9:30 AM to 12:00 PM
Friday: 11:30 AM to 1:30 PM

Course lecturer
Full name: Prof. Bhumi M Shah
Department with siting location:CE Department,3rd Floor,Staff Room,Bhanvar Building
Telephone:-NA
Email:bhumishah.ce@indusuni.ac.in
Consultation times: Thursday: 9:30 AM to 12:00 PM
Friday: 11:30 AM to 1:30 PM

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

1. Be successful professionals and entrepreneur in the field with solid fundamental knowledge of software engineering and Project Management.
2. Utilize and exhibit strong communication and interpersonal skills development, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams.
3. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles, and processes.
4. To gain the techniques and skills on how to use modern software testing tools to support software testing projects that lead them to employability in the industry.
5. To familiarize Project Management framework and Tools Contents.

Course Outcomes (CO)

At the end of this subject, students should be able to:

1. Apply use of knowledge of Software Life Cycle to successfully implement the projects in the corporate world.
2. Implement Project Management Processes to successfully complete project in IT industry.
3. Apply the concept of Functional Oriented and Object-Oriented Approach for Software Design.
4. Recognize how to ensure the quality of software product, different quality standards and software review techniques.
5. Identify the Inputs, Tools, and techniques to get the required Project deliverable and Product deliverable using Knowledge areas of Project Management and Apply various testing techniques and test plans and
6. Will be Able to understand modern Agile Development and Service Oriented Architecture Concept of Industry.

Course Outline

UNIT-I [12 hours]

Introduction to Software and Software Engineering.

Introduction to Software Engineering-Software, Evolving role of software, characteristic of software, Three "R"-Reuse, Reengineering and Retooling, SDLC, various Software Process Models, waterfall model, spiral model, incremental model, RAD model, Agile Development

UNIT-II [12 hours]

Software Requirement Analysis & Specification(SRS) and basic of testing

SRS, quality of good SRS, Types of Requirement, Feasibility Study, Requirement Analysis, requirement engineering task, design concepts- abstraction, modularity, information hiding, functional independence-cohesion, coupling, testing, types of testing, black box, white box testing.

UNIT-III [12 hours]

Software Project Management

Project Management- Project planning,4 P of management, W^5HH Principle.

Metrics for process and project- Product metrics, Process metrics, Project metrics, LOC, FUNCTION POINT

Project Estimation techniques- Empirical estimation techniques, Heuristic techniques, COCOMO model.

Project scheduling- methods, Work breakdown structure, Task network analysis (ACTIVITY NETWORK), Gantt chart, PERT, CPM

UNIT-IV **[12 hours]**

Management

Risk Management – software risk, risk identification, risk projection, risk refinement, risk mitigation and monitoring,

Quality Management-quality control vs quality assurance, software review, types of review, reliability, and availability.

Change management-configuration management, change control, version control.

Method of delivery

Chalk and Board, PowerPoint presentation

Study time

3 Hours theory and 2 hours of Practical per week

CO-PO Mapping (PO: Program Outcomes)

Engineering Graduates will be able to:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	√	√	√	√								√		√	
CO2								√	√	√	√			√	√
CO3					√							√	√		√

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

Figure 1: Blooms Taxonomy

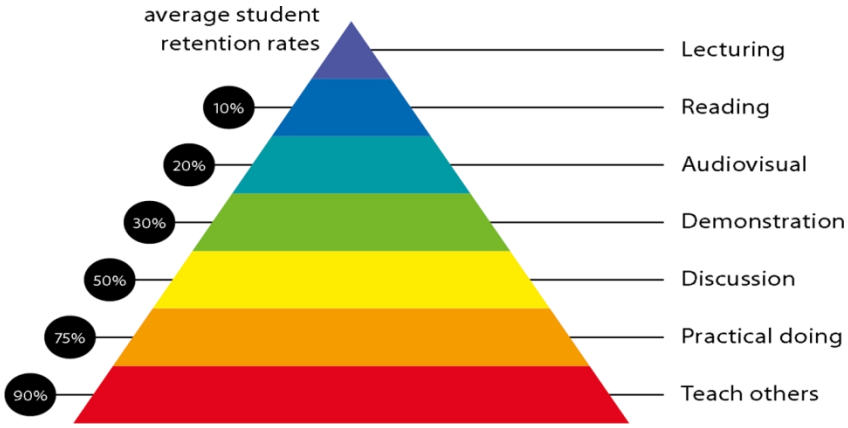


Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, inquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem-solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**

Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

Experiment. No.	Title	Learning Outcomes
1	Study of different software engineering models. Waterfall model, Prototype model, Incremental model, Spiral model and RAD Models, Scrum Model. Select any application for which software development process can be defined and find out which process model will be more suitable for application.	CO1,CO5
2	Prepare Software Requirement Specification (SRS) document for chosen application	CO1,CO2
3	Draw E-R diagram and class diagram for chosen application	CO3
4	Write Use case Scenario and draw Use Case Diagram for chosen application.	CO3
5	Draw Activity diagram for selected application.	CO3
6	Draw sequence diagram for selected application.	CO3
7	Draw Data Flow Diagram (DFD) for selected application	CO3
8	Apply FP oriented estimation model for selected application.	CO4
9	Study of various software testing methods and design test cases for selected application	CO5
10	Study of any two Open source tools in DevOps for Infrastructure Automation, Configuration Management, Deployment Automation, Performance Management, Log Management and Monitoring	CO6

Lecture/tutorial times

Example:	
Practical	
Lecture	**Monday**
Lecture	**Tuesday**
Lecture	**Wednesday**

Attendance Requirements

The University norms state that it is the responsibility of students to attend all lectures, tutorials, seminars, and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Reference Books:

1. Managing Information Technology Project, 6edition, by Kathy Schwalbe, Cengage Learning publication.
2. Information Technology Project Management by Jack T Marchewka Wiley India publication.
3. Software Engineering 3rd edition by KK Agrawal, Yogesh Singh, New Age International publication.
4. Software Engineering Project Management by Richard H. Thayer Wiley India Publication.
5. Software Engineering for students: A Programming Approach by Douglas Bell, Pearson publication.

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE-Theory (60 Marks) **Class Regularity:10 Marks** **Quiz/Assignment:10** **Mid Sem Exam:40 Marks**	**CIE-Practical (60 Marks)** **Lab Regularity:10 Marks** **Lab Performance/Submission:20 Marks** **Presentation:10 Marks** **Quiz:20 Marks**
ESE-Theory- 40 Marks	**ESE-Practical-40 Marks**
Total: 200 Marks	**Total: 200 Marks**

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

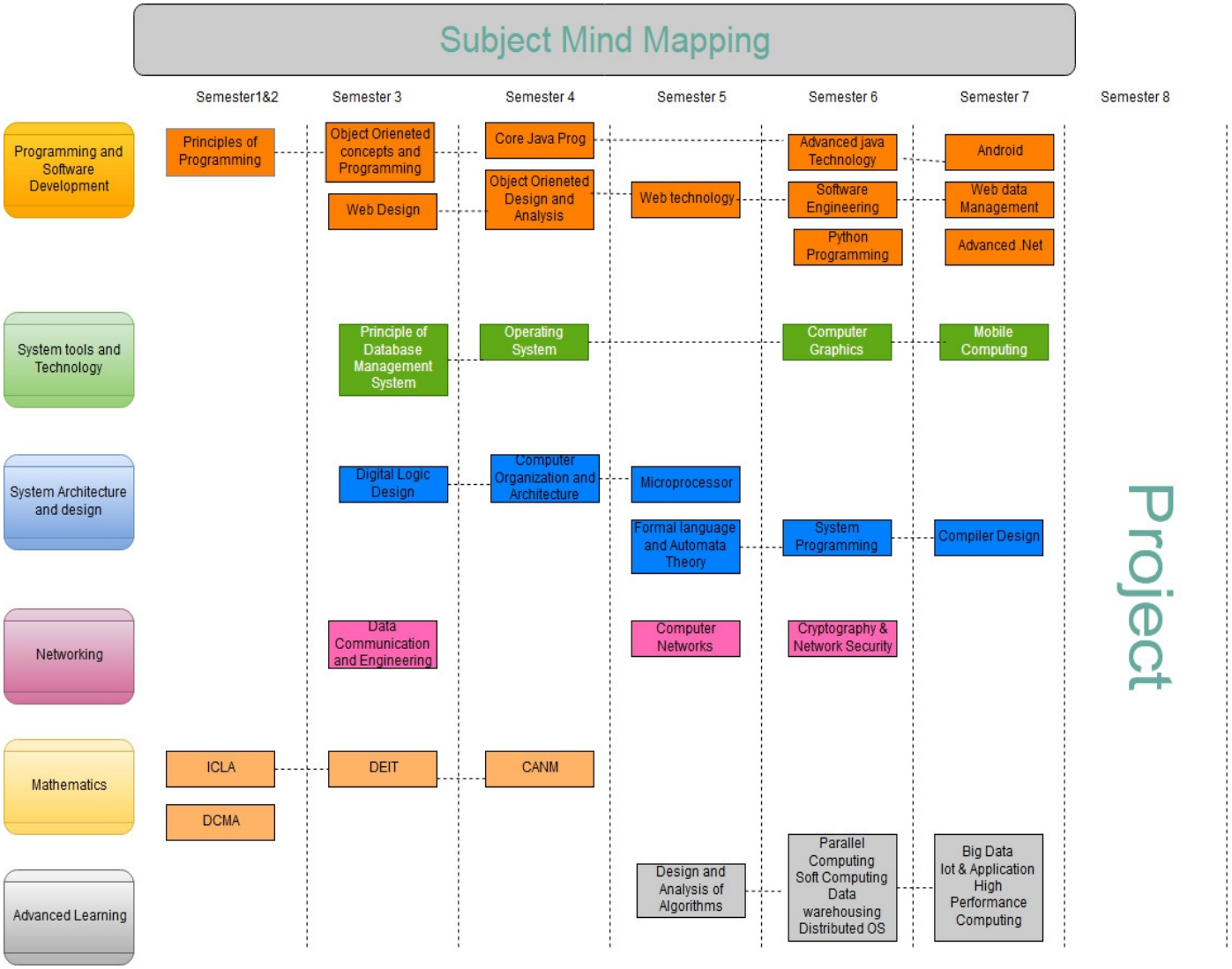
Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

Course schedule(subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Week 1	Introduction to Software Engineering-Software, Evolving role of software, characteristic of software	1	Presentation, Chalk & Board
	Week 2	Three "R"-Reuse, Reengineering and Retooling, SDLC, various Software Process Models	1,2	Presentation, Chalk & Board
	Week 3	waterfall model, spiral model, incremental model	*1,2*	Presentation, Chalk & Board
	Week 4	RAD model, Agile Development	1,2	Presentation, Chalk & Board
	Week 5	SRS, quality of good SRS, Types of Requirement, Feasibility Study	1,2	Presentation, Chalk & Board
	Week 6	Requirement Analysis, requirement engineering task,	*1,2*	Presentation, Chalk & Board
	Week 7	design concepts- abstraction, modularity, information hiding, functional independence- cohesion, coupling	1,2	Presentation, Chalk & Board
	Week 8	testing, types of testing, black box, white box testing	2	Presentation, Chalk & Board
	Week 9	Project Management- Project planning,4 P of management, W5HH Principle	*2*	Presentation, Chalk & Board
	Week 10	Metrics for process and project- Product metrics, Process metrics, Project metrics, LOC, FUNCTION POINT	2,3	Presentation, Chalk & Board
	Week 11	Project Estimation techniques- Empirical estimation techniques, Heuristic techniques, COCOMO model	2,3	Presentation, Chalk & Board
	Week 12	Project scheduling- methods, Work breakdown structure, Task network analysis (ACTIVITY NETWORK), Gantt chart, PERT, CPM	2,3	Presentation, Chalk & Board
	Week 13	Risk Management – software risk, risk identification, risk projection	2,3	Presentation, Chalk & Board
	Week 14	Risk refinement, risk mitigation and monitoring	2,3	Presentation, Chalk & Board
	Week 15	Quality Management-quality control vs quality assurance, software review, types	2,3	Presentation, Chalk & Board

		of review, reliability, and availability		
	Week 16	Change management-configuration management,change control, version control	2,3	Presentation, Chalk & Board



Name of Institute: IITE Indus University Ahmedabad
Name of Faculty: Prof Aakansha Saxena

Course code: IT0601
Course name: **Software Testing and Quality Assurance**
Pre-requisites: Basic Knowledge about Software and basic Programming skills
Credit points: 3
Offered Semester: 6th

Course Coordinator (weeks 17)
Full Name: Prof Aakansha Saxena
Department with sitting location: 3rd floor Bhanvar Building
Telephone: 7016668183
Email: aakanshasaxena.ce@indusuni.ac.in
Consultation times: 3.00 P.M. to 5.00 P.M. (Monday to Friday)

Course Lecturer (weeks 17)
Full Name: Prof Aakansha Saxena
Department with sitting location:3rd floor Bhanvar Building
Telephone: 7016668183
Email: aakanshasaxena.ce@indusuni.ac.in
Consultation times: 3.00 P.M. to 5.00 P.M. (Monday to Friday)

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

On completion of this course, the student will be able to apply modern software testing processes in relation to software development and project management. They are able to create test strategies and plans, design test cases, prioritize and execute them. They will also gain the knowledge of software management principles such as quality assurance, process improvement, configuration management and software quality management.

Course Outcomes (CO)

After successful completion of the course, student will able:

1. Understand software testing and quality assurance as a fundamental component of software life cycle.

2. Apply white-box testing, black-box testing, and inspection techniques know how test tools can be used in the testing life cycle.
3. Learn how to do performance testing and usability testing.
4. Understand Systematic approach to the development, operation, testing and maintenance of software.
5. Understand and discuss the benefits, needs and techniques of software reviews, software testing and configuration management.

Course Outline

This Course will provide insights to the important phases of testing, their peer reviews, as well as the significance of each phase when testing different types of software. Students will learn the state of the art in testing technology for object-oriented, component-based, concurrent, distributed, graphical-user interface, and web software. In addition, closely related concepts such as mutation testing and program analysis (e.g., program-flow and data-flow analysis) will also be studied. Emerging concepts such as test-case prioritization and their impact on testing will be examined. By the end of this course, students should be familiar with the state-of-the-art in software testing. Students should also be aware of the major open research problems in testing.

Method of delivery

(Online lectures, self-study material, Active Learning Techniques)

Study time

(3 Hours Per Week)

CO-PO Mapping (PO: Program Outcomes)

1 Program Outcomes (PO's)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public

health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2. Programme Specific Outcome

Computer Engineering

1. To understand the principles and working of computer systems.
2. To Design and develop computer programs in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics.

3. Should able to understand the structure and development methodologies of software systems with the use of a various programming languages and open source platforms

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO110	PO111	PO112	PSO1	PSO2	PSO3
1	√	√	√	√	√			√		√		√	√	√	√
2	√	√			√	√	√	√			√		√	√	
3	√	√	√	√		√			√	√		√	√	√	
4		√	√		√		√		√		√			√	√
5			√	√	√			√	√		√	√		√	√
6	√	√	√			√	√		√		√		√	√	√

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

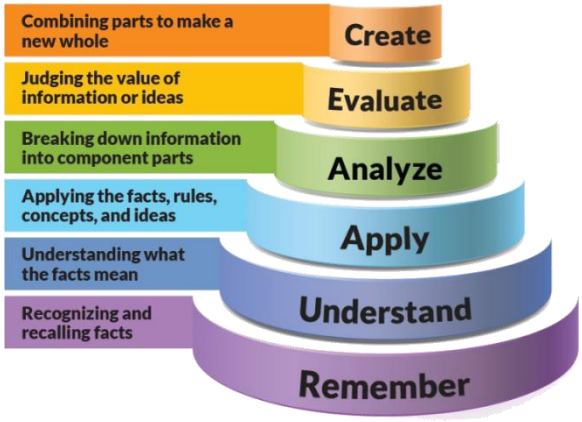


Figure 1: Blooms Taxonomy

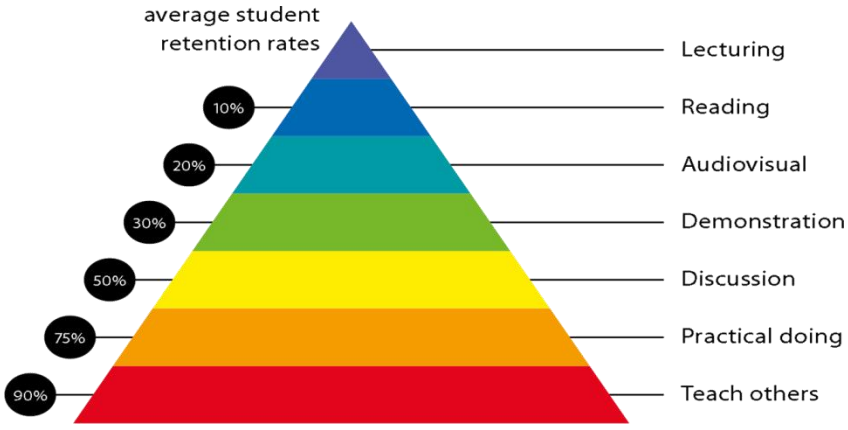


Figure 2: Knowledge retention

Lecture/tutorial times

(Give lecture times in the format below)

Monday: 12.20 PM-01.20 PM
Tuesday: 11.10 AM-12.10 PM
Thursday: 03.10 PM-04.10 PM

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be used in written work

Text books:

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Editions.
2. Software Testing Principles and Practices 2nd Edition Naresh Chauhan oxford higher Education.

Reference Books:

1. Ian Sommerville, "Software Engineering", 7th Edition, Pearson Education, 2007.
2. M G Limaye, "Software Testing – Principles, Techniques and Tools", McGraw Hill, 2011.
3. Ilene Burnstein, "Practical Software Testing", Springer International Edition, Chennai, 2003.
4. Milind Limaye, "Software Quality Assurance", McGraw Hill, 2011.

Additional Materials

Web Resources

1. http://www.opensourcetesting.org/
2. http://www.onestoptesting.com/
3. http://opensource.com/business/14/1/top-project-management-

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Theory:

Mid Semester Exam [40 Marks]

Assignment [05 Marks]

Attendance bonus for all students

having attendance > 80% [05 Marks]

Presentation + Report [10 Marks]

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

This Course does not include Practical Portion.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.

Do not share your work with other students (except where required for a group activity or assessment)

Course schedule

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

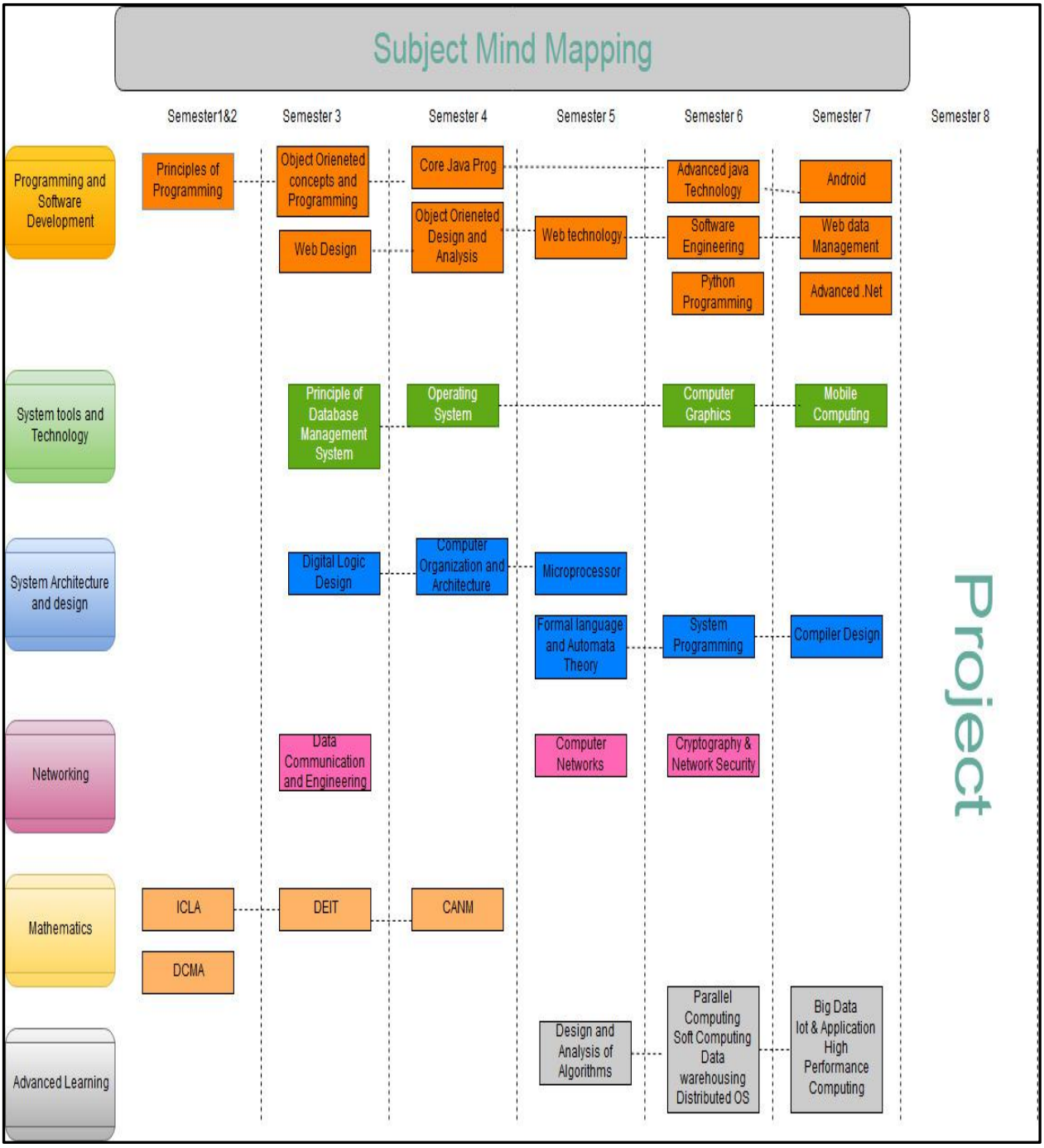
	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Week 1	**Introduction to Software and Software Engineering.** The Evolving Role of Software, Software: A Crisis on the Horizon and Software Myths,Software Engineering: A Layered Technology, Software Process Model, Linear Sequential Model	1,4	Online Session with PPT/ Notepad
	Week 2	The Prototyping Model, The RAD Model, Evolutionary Process Models, Agile Process Model, Component-Based Development, Process, Product and Process.	4,5	Online Session with PPT/ Notepad
	Week 3	**Introduction to Software Testing.** Need of testing, Basic concepts – errors, faults, defects, failures, Testing Principles, Goals ,Testing Life Cycle – Roles and activities, Test Planning– forming a test team, develop test plan review, Test Plan(IEEE format),Strategic Approach to Software Testing	*1, 2,4*	Online Session with PPT/ Notepad
	Week 4	Verification and Validation, Organizing for Software Testing , Software Testing Strategy—The Big Picture, Criteria for Completion of Testing , Strategic Issues ,Test	1,4	Online Session with PPT/ Notepad

		Strategies for Conventional Software .		
	Week 5	**Testing Principles** Unit Testing ,Integration Testing ,Test Strategies for Object-Oriented Software ,Unit Testing in the OO Context ,Integration Testing in the OO Context	1,2	Online Session with PPT/ Notepad
	Week 6	Test Strategies for Web Apps ,Validation Testing , Validation- Test Criteria ,Configuration Review, Alpha and Beta Testing, System Testing ,System Testing , Recovery testing, Security Testing, Stress testing	2,4	Online Session with PPT/ Notepad
	Week 7	Performance Testing ,Deployment Testing ,The Art of Debugging,The Debugging Process ,Psychological Considerations, Debugging Strategies ,Correcting the Error.	3,4	Online Session with PPT/ Notepad
	Week 8	**Testing Conventional Applications** Software Testing Fundamentals ,Internal and External Views of Testing ,White-Box Testing ,Basis Path Testing ,Flow Graph Notation	2,3	Online Session with PPT/ Notepad **Case Based Assignment**
	Week 9	Independent Program Paths ,Deriving Test Cases ,Graph Matrices , Control Structure Testing ,Condition Testing ,Data Flow Testing ,Loop Testing ,Black-Box Testing Graph-Based Testing Methods	*2,3*	Online Session with PPT/ Notepad

	Week 10	Equivalence Partitioning ,Boundary Value Analysis ,Orthogonal Array Testing Model-Based Testing ,Testing for Specialized Environments, Architectures, and Applications ,Testing GUIs	1,3	Online Session with PPT/ Notepad
	Week 11	Testing of Client-Server Architectures ,Testing Documentation and Help Facilities ,Testing for Real-Time Systems ,Patterns for Software Testing.	2,3	Online Session with PPT/ Notepad
	Week 12	**Software Quality Assurance** Quality Assurance and Management Quality Concepts and Software Quality Assurance, Software Reviews (Formal Technical Reviews), Inspection,	4,5	Online Session with PPT/ Notepad
	Week 13	Walk through,Software Reliability, The Quality Standards: ISO 9000, CMM, Six Sigma for SE, SQA Plan.	4,5	Online Session with PPT/ Notepad
	Week 14	The SCM Process, Identification of Objects in the Software Configuration, Version Control and Change Control.	5	Online Session with PPT/ Notepad
	Week 15	**Advanced Topics in Software Testing** Test Suites Design, Testing Conventional Applications, Testing Object Oriented Applications, Testing Web and Mobile Applications, Testing Tools (Win runner, Load runner).	1,4,5	Online Session with PPT/ Notepad
	Week 16	Test case design and Studies based on various Software Testing (for ex. Design the test	4,5	Online Session with PPT/

		cases for login page. 2. Manual Testing for PAN card verification.3. Generate test case for ATM machine.)		Notepad
	Week 17	Presentation By Students on Given Topic	1,2,3,4,5	Online Session with PPT

PROGRAM MAP for Bachelor of Engineering (CE / CSE / IT)



Name of Institute: Institute of Engineering and Technology
Name of Faculty: Prof.Bhumi M Shah

Course code: CE0616
Course name: Software Engineering with UML
Pres-requisites: Object Oriented Programming Fundamentals
Credit points: 4
Offered Semester: VI

Course coordinator
Full name: Prof. Bhumi M Shah
Department with siting location:CE Department,3rd Floor,Staff Room,Bhanvar Building
Telephone:-NA
Email:bhumishah.ce@indusuni.ac.in
Consultation times: Thursday: 9:30 AM to 12:00 PM
Friday: 11:30 AM to 1:30 PM

Course lecturer
Full name: Prof. Bhumi M Shah
Department with siting location:CE Department,3rd Floor,Staff Room,Bhanvar Building
Telephone:-NA
Email:bhumishah.ce@indusuni.ac.in
Consultation times: Thursday: 9:30 AM to 12:00 PM
Friday: 11:30 AM to 1:30 PM

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

1. Be successful professionals and entrepreneur in the field with solid fundamental knowledge of software engineering.
2. Utilize and exhibit strong communication and interpersonal skill development, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams.
3. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles, and processes for employability in industries and entrepreneurship.
4. To gain the techniques and skills on how to use modern software testing tools to support software testing projects that lead them to employability in the industry.
5. To expose Software Process Improvement and Reengineering.

Course Outcomes (CO)

At the end of this subject, students should be able to:

1. Prepare Software Requirement Specification document.
2. Prepare Software Project Management Plan document.
3. Apply the concept of Functional Oriented and Object-Oriented Approach for Software Design.
4. Recognize how to ensure the quality of software product, different quality standards and software review techniques.
5. Apply various testing techniques and test plans.
6. Will be Able to understand modern Agile Development and Service Oriented Architecture Concept of Industry.

Course Outline

UNIT-I **[12 hours]**

Introduction to Software and Software Engineering.

The Evolving Role of Software, Software: A Crisis on the Horizon and Software Myths, Software Engineering: A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Process Models, Agile Process Model, Component-Based Development, Process, Product and Process.

UNIT-II **[12 hours]**

Requirement Analysis and Specification

Requirement Analysis and Specification Understanding the Requirement, Requirement Modeling, Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation, Requirement Engineering. Software Design Design Concepts and Design Principal, Architectural Design, Component Level Design,Function Oriented Design and Data flow Diagram, Drawing rules, Leveling of DFD Level 0, Level 1, Level 2.

UNIT-III **[12 hours]**

Project Management Concepts & Project Metrics

Project Management Concepts & Project Metrics: The Management Spectrum, People, Product, Process, Project, The W5HH Principle, Metrics in the Process and Project Domains (FP & LOC), Software Measurement, Metrics for Project Software Project Software Metrics (Process, Product and Project Metrics), Software Project Estimations, Software Project Planning (MS Project Tool), Project Scheduling & Tracking, Project Planning Objectives, Software Project Estimation using COCOMO Model.

Risk Analysis & Quality Management

Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation. Quality Assurance and Management Quality Concepts and Software Quality Assurance, Software Reviews Formal Technical Reviews.

UNIT-IV **[12 hours]**

Software Testing and Advanced Topics
Software Testing Fundamentals and Test Case Design, White-Box Testing and Black-Box Testing Testing Strategies, Testing Techniques and Test Case, Levels of testing Unit testing system testing Integrating Testing.
Advanced Topics in Software Engineering .
Introduction to Reengineering, Reverse engineering, Agile Development.

Method of delivery
Chalk and Board, Power point Presentation

Study time
3 Hours theory and 2 hours of Practical per week

CO-PO Mapping (PO: Program Outcomes)

Engineering Graduates will be able to:
PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend

and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	√	√	√	√								√		√	
CO2								√	√	√	√			√	√
CO3					√							√	√		√
CO4	√	√			√				√		√	√			
CO5	√	√	√	√				√			√	√			√

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

Figure 1: Blooms Taxonomy

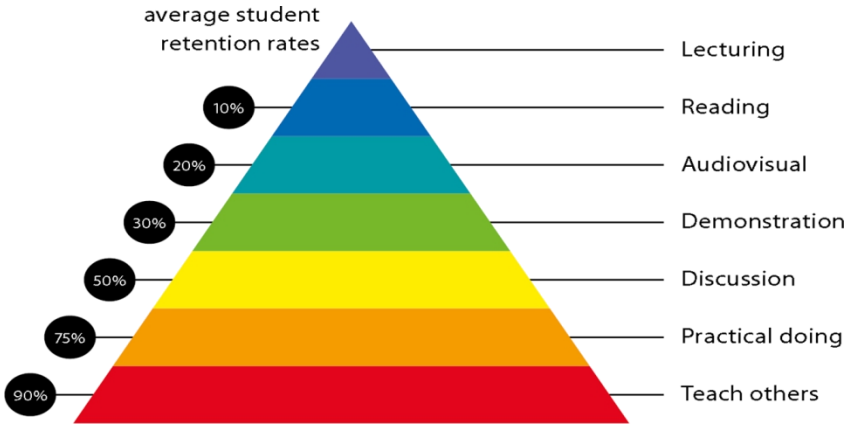


Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, inquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem-solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**

Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

Experiment. No.	Title	Learning Outcomes
1	Study of different software engineering models. Waterfall model, Prototype model, Incremental model, Spiral model and RAD Models, Scrum Model. Select any application for which software development process can be defined and find out which process model will be more suitable for application.	CO1,CO5
2	Prepare Software Requirement Specification (SRS) document for chosen application	CO1,CO2
3	Draw E-R diagram and class diagram for chosen application	CO3
4	Write Use case Scenario and draw Use Case Diagram for chosen application.	CO3
5	Draw Activity diagram for selected application.	CO3
6	Draw sequence diagram for selected application.	CO3
7	Draw Data Flow Diagram (DFD) for selected application	CO3
8	Apply FP oriented estimation model for selected application.	CO4
9	Study of various software testing methods and design test cases for selected application	CO5
10	Study of any any two Open source tools in DevOps for Infrastructure Automation, Configuration Management, Deployment Automation, Performance Management, Log Management and Monitoring	CO6

Lecture/tutorial times

Example:	
Practical	
Lecture	**Monday**
Lecture	**Tuesday**
Lecture	**Wednesday**

Attendance Requirements

The University norms state that it is the responsibility of students to attend all lectures, tutorials, seminars, and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Text books

1. Software Engineering Roger Pressman, McGraw-Hill Science

2. Fundamentals of Software Engineering, Rajeev mall, PHI

3. Software Engineering: Theory and Practice, 2 nd ed., S. L. P fleeger, Pearson Education

ASSESSMENT GUIDELINES

CIE-Theory (60 Marks) **Class Regularity:10 Marks** **Quiz/Assignment:10** **Mid Sem Exam:40 Marks**	**CIE-Practical (60 Marks)** **Lab Regularity:10 Marks** **Lab Performance/Submission:20 Marks** **Presentation:10 Marks** **Quiz:20 Marks**
ESE-Theory- 40 Marks	**ESE-Practical-40 Marks**
Total: 200 Marks	**Total: 200 Marks**

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

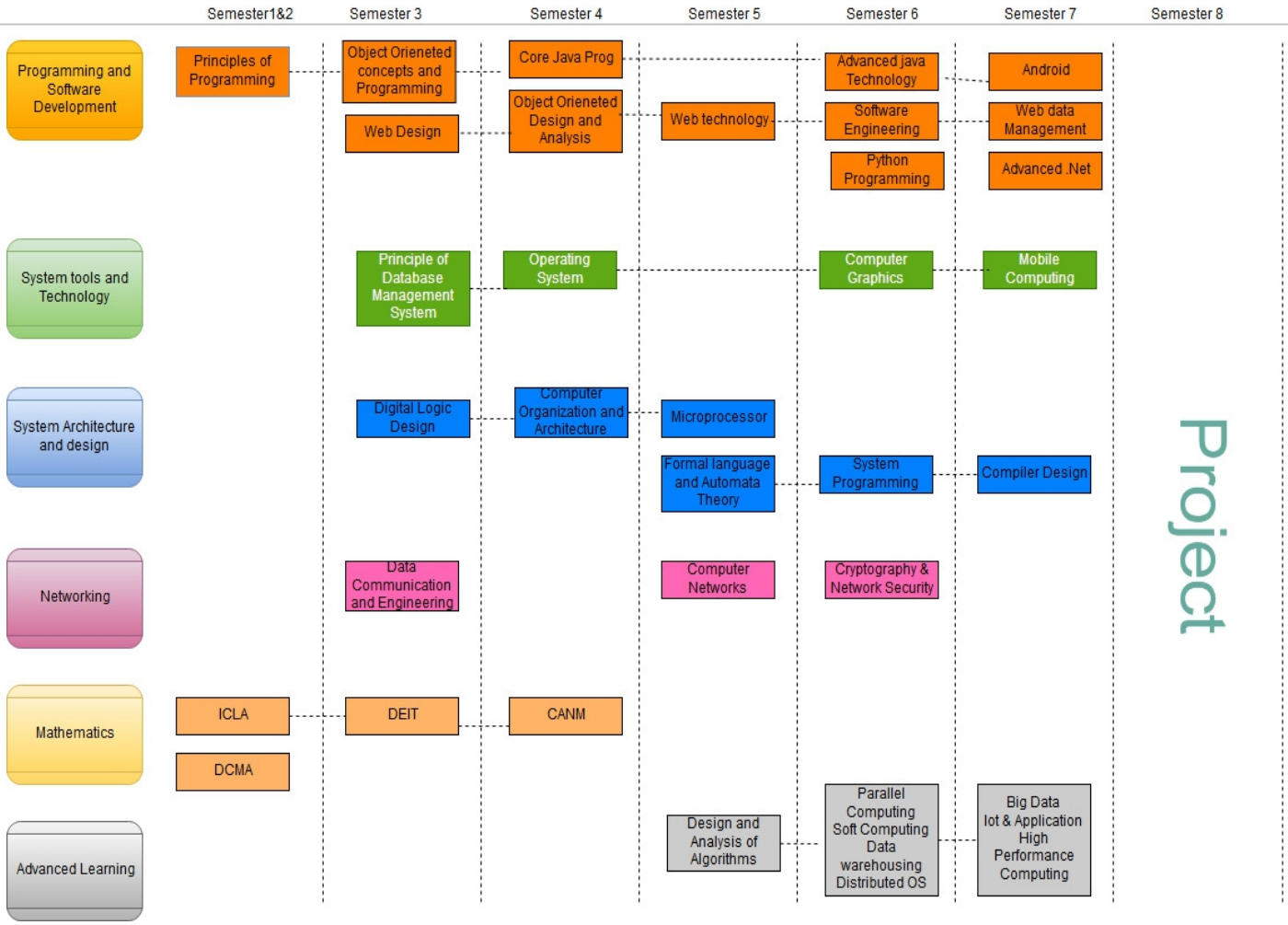
Course schedule(subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Week 1	The Evolving Role of Software, Software: A Crisis on the Horizon and Software Myths,	2	Presentation, Chalk & Board
	Week 2	Software Engineering: A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model	1,2	Presentation, Chalk & Board
	Week 3	The RAD Model, Evolutionary Process Models, Component-Based Development	*1,2*	Presentation, Chalk & Board
	Week 4	Agile Process Model,Process, Product and Process.	1,2	Presentation, Chalk & Board
	Week 5	Requirement Analysis and Specification Understanding the Requirement, Requirement Modeling	2	Presentation, Chalk & Board
	Week 6	Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation	*2*	Presentation, Chalk & Board
	Week 7	Requirement Engineering. Software Design Design Concepts and Design Principal, Architectural Design, Component Level Design	2	Presentation, Chalk & Board
	Week 8	Function Oriented Design and Data flow Diagram, Drawing rules, Leveling of DFD Level 0, Level 1, Level 2.	3	Presentation, Chalk & Board
	Week 9	Project Management Concepts & Project Metrics: The Management Spectrum, People, Product, Process, Project, The W5HH Principle, Metrics in the Process and Project Domains (FP & LOC)	*3*	Presentation, Chalk & Board
	Week 10	Software Measurement, Metrics for Project Software Project Software Metrics (Process, Product and Project Metrics), Software Project Estimations, Software Project Planning (MS Project Tool)	3,4	Presentation, Chalk & Board
	Week 11	Project Scheduling & Tracking, Project Planning Objectives, Software Project Estimation using COCOMO Model	3,4	Presentation, Chalk & Board
	Week 12	Risk Identification, Risk Projection, Risk	4	Presentation, Chalk

		Refinement, Risk Mitigation. Quality Assurance and Management Quality Concepts and Software Quality Assurance, Software Reviews Formal Technical Reviews.		& Board
	Week 13	Software Testing Fundamentals and Test Case Design, White-Box Testing and Black-Box Testing Testing Strategies	4	Presentation, Chalk & Board
	Week 14	Testing Techniques and Test Case, Levels of testing Unit testing system testing Integrating Testing.	4	Presentation, Chalk & Board
	Week 15	Introduction to Reengineering, Reverse engineering	5	Presentation, Chalk & Board
	Week 16	Agile Development.	5	Presentation, Chalk & Board

Subject Mind Mapping



Name of Institute: IITE Indus University Ahmedabad
Name of Faculty: Dr. Gaurav Kumar Ameta

Course code: CE0617
Course name: Theory of Computation
Pre-requisites: Basic knowledge of Discrete Mathematics
Credit points: 4
Offered Semester: 6th

Course Coordinator (weeks 12)
Full Name: Dr. Gaurav Kumar Ameta
Department with sitting location: 4th floor Bhanvar Building
Telephone: 9413664420
Email: gauravameta.ce@indusuni.ac.in
Consultation times: 3.00 P.M. to 5.00 P.M. (Monday to Friday)

Course Lecturer (weeks 12)
Full Name: Dr. Gaurav Kumar Ameta
Department with sitting location: 4th floor Bhanvar Building
Telephone: 9413664420
Email: gauravameta.ce@indusuni.ac.in
Consultation times: 3.00 P.M. to 5.00 P.M. (Monday to Friday)
Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

- To provide a Basic understanding of the Lexical Phase of Compiler Design.
- To provide the knowledge about Regular Language, and design of Finite Automata.
- To provide the knowledge about Context Free Language, and design of Push down Automata.
- To provide the knowledge about Turing Machine and Complexity.

Course Outcomes (CO)
After successful completion of the course, student will able to:

1. Master regular languages and finite automata. Student will be able to Design Deterministic finite automata, Nondeterministic finite automata, conversion of NFA to DFA, design of E- NFA and regular expressions
2. Student will be able to obtain minimized DFA and convert automata to regular expressions and regular expression to automata and proving languages are not regular.

3. Master context free languages, push-down automata. Student will be able to Write CFG's, Construction of parse trees, finding and removing ambiguity in grammars, designing problems on Pushdown Automata.
4. Student will be able to Convert grammar to Chomsky Normal Form and conversion of grammar to PDA. Prove that languages are not context free using pumping lemma
5. Student will be able to Design turing machines, understand the working of various types of turing machines and solving post correspondence problems
6. Be exposed to a broad overview of the theoretical foundation of computer science.

Course Outline

This course will provide the insights to the various topics related to computation like Automata, Types of Automata, Grammars, Normal Forms, PDA and Turing Machines.

Method of delivery

(Face to face lectures, Online Lectures, self-study material in form of PPT, Active Learning Techniques)

Study time

(4 hours theory per week including class attendance)

CO-PO Mapping (PO: Program Outcomes)

1 Program Outcomes (PO's)

Engineering Graduates will be able to:

- **PO1** **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2** **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3** **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4** **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5** **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- **PO6** **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest con text of technological change.

2. Programme Specific Outcome

Computer Engineering

1. To understand the principles and working of computer systems.

2. To Design and develop computer programs in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics.

CO	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 10	PO1 11	PO1 12	PSO 1	PSO 2	PSO 3
1	√	√	√							√			√	√	
2	√	√	√							√			√	√	
3	√	√	√							√			√	√	
4	√	√	√							√			√	√	
5	√	√	√							√			√	√	
6	√	√											√		

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

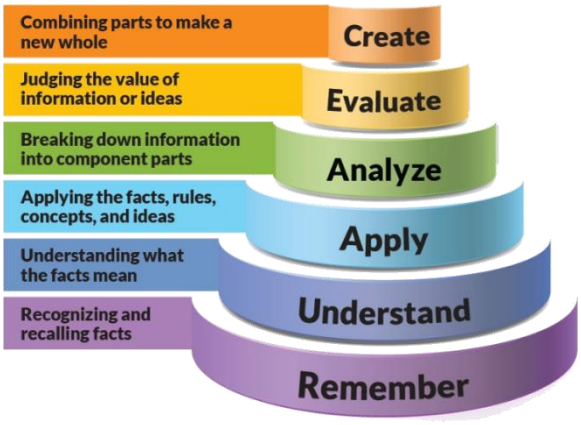


Figure 1: Blooms Taxonomy

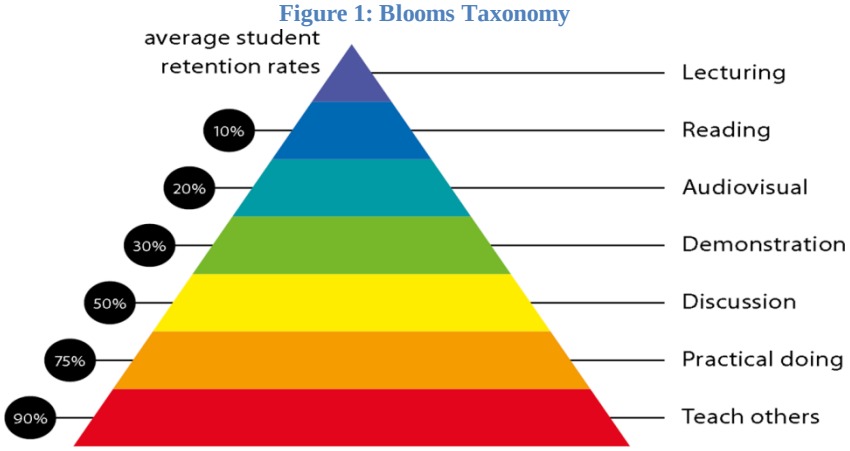


Figure 2: Knowledge retention

Lecture/tutorial times

(Give lecture times in the format below)

Monday: 12:20PM to 01:20PM
Tuesday: 02:00PM to 03:00PM
Wednesday: 11:10AM to 12:10AM
Friday: 11:10AM to 12:10AM

as per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be used in written work

Text books:

1. Introduction to languages and Theory Of Computation by John C. Martin, Third Edition, TMH Publication.
2. Introduction to Automata theory, Formal Languages and Computations by Shyamalendu Kandar, Pearson Publication.
3. Theory of Computer Science by KLP Mishra and N. Chandrasekharan, PHI Publication.

Reference Books

1. Formal Languages and Automata Theory by C.K. Nagpal, Oxford Publication

2. Automata theory, Languages and computation by Hopcroft, Motwani, Ullman, Pearson Education.

Additional Materials

Web Resources:

1. http://nptel.iitm.ac.in/courses/106104028/
2. http://www.cse.iitb.ac.in/~supratik/courses/cs331/
3. http://nptel.iitm.ac.in/courses/106106049/

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Theory:

Mid Sem Exam [40 Marks]

Assignment [10 Marks]

attendance bonus for all students having

attendance > 80% [05 Marks]

presentation [05 Marks]

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

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Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

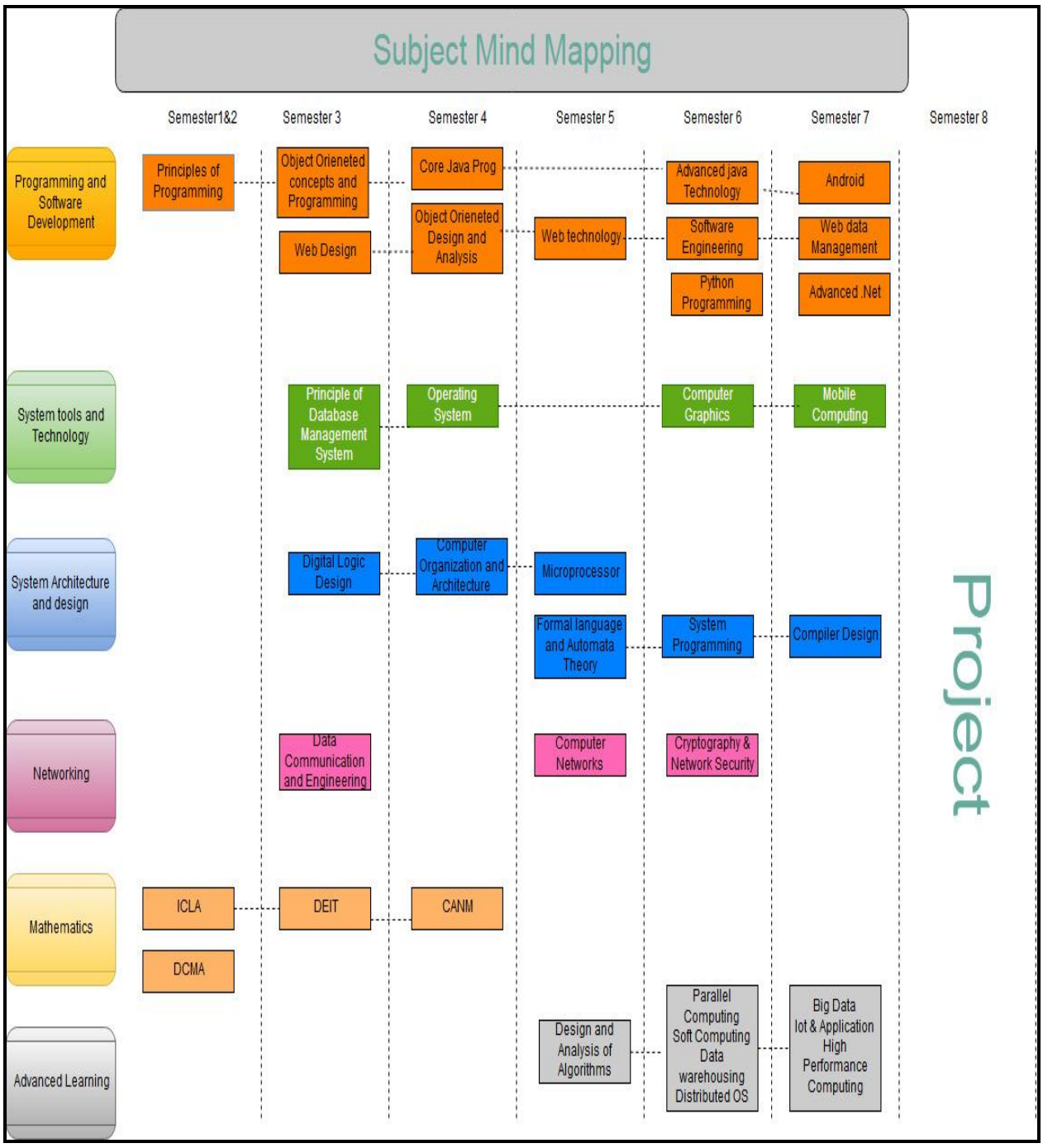
Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Week 1	Sets, Functions & Relations	6	Chalk & BB/Online Session with PPT
	Week 2	Basic to alphabet, string, languages and grammars , Mathematical induction and recursive definition	6	Chalk & BB/Online Session with PPT
	Week 3	Regular language and regular expressions, Deterministic finite automata, Minimization of finite automata	*1*	Chalk & BB/Online Session with PPT
	Week 4	Operations on Finite automata, Nondeterministic Finite Automata, Conversion of NFA to DFA	1,2	Chalk & BB/Online Session with PPT
	Week 5	NFA-^, Conversion of NFA-^ to NFA and DFA, Kleene's Theorem, Pumping lemma for regular Languages	1,2,3	Chalk & BB/Online Session with PPT
	Week 6	Introduction to CFG, Derivation and Parse Tree, Ambiguity in CFG.	*3*	Chalk & BB/Online Session with PPT
	Week 7	Left factoring and Left Recursion, Simplification of CFG.	3,4	Chalk & BB/Online Session with PPT
	Week 8	Linear Grammar, Normal Forms (GNF and CNF), Applications of CFG Push-Down Automata (PDA): Introduction of PDA.	4	Chalk & BB/Online Session with PPT
	Week 9	DPDA and NPDA, Construction of PDA from CFG and vice versa, Parsing.	*4*	Chalk & BB/Online Session with PPT
	Week 10	Introduction to TM, Variations of TM, Non deterministic TM, Universal TM.	4,5	Chalk & BB/Online Session with PPT
	Week 11	Two Stack PDA and Turing machine, Models of Computation and the Church Turing Thesis	4,5	Chalk & BB/Online Session with PPT

	Week 12	Types of complexity, Different Notations, Complexity Classes, P and NP problems, Polynomial time reducibility	5,6	Chalk & BB/Online Session with PPT

PROGRAM MAP for Bachelor of Engineering
(CE / CSE / IT)



Name of Institute: Indus Institute of Technology and Engineering
Name of Faculty: Pruthvi Patel

Course code: CE0630
Course name: Data Science

Pre-requisites: Basic knowledge of Mathematics, Programming, Database
Credit points: 4
Offered Semester: VI

Course Coordinator
Full Name: Pruthvi Patel
Department with sitting location: Computer engineering (4th Floor Staff Room)
Telephone:
Email: pruthvipatel.ce@indusuni.ac.in
Consultation times: Everyday 4:00 to 5:00 PM

Course Lecturer
Full Name: Pruthvi Patel
Department with sitting location: Computer engineering (4th Floor Staff Room)
Telephone:
Email: pruthvipatel.ce@indusuni.ac.in
Consultation times: Everyday 4:00 to 5:00 PM

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

By participating in and understanding all facets of this Course a student will:

1) Learn the fundamentals of data analytics and the data science pipeline
2) Learn how to scope the resources required for a data science project
3) Apply principles of Data Science to the analysis of business problems.
4) Apply data mining software to solve real-world problems.
5) Employ cutting edge tools and technologies to analyse Big Data

Course Outcomes (CO)

1) Students will demonstrate knowledge of data analytics.
2) Students will demonstrate the ability to think critically in making decisions based on data.
3) Students will able to interpret data, extract meaningful information, and assess findings.
4) Students will identify and analyze social, legal, and ethical issues in data science.

5) Students will be able to choose and apply tools and methodologies to solve data science tasks.
6) Students will be able to implement statistics and mathematical concepts along with machine learning algorithm.

Course Outline

UNIT-I	[12 hours]
Introduction	
Defining Data Science , What do data science people do?, Current landscape of perspectives, Data Science in Business, Use Cases for Data Science	
UNIT-II	**[12 hours]**
Statistical Inference: Statistical modeling, probability distributions, fitting a model, Intro to R	
Descriptive Statistics: Introduction to the course, Descriptive Statistics, Probability Distributions	
Inferential Statistics: Inferential Statistics through hypothesis tests, Permutation & Randomization Test	
UNIT-III	**[12 hours]**
Machine Learning Introduction and Concepts: Differentiating algorithmic and model based frameworks, Regression: Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbors, Regression & Classification	
Supervised Learning with Regression and Classification techniques: Bias-Variance Dichotomy, Model Validation Approaches, Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis, Regression and Classification Trees, Support Vector Machines, Ensemble Methods: Random Forest, Neural Networks, Deep learning	
Unsupervised Learning and data modeling: Clustering, Associative Rule Mining, Logical Modeling: Converting a conceptual model to logical model, Integrity constraints, Normalization	
UNIT-IV	**[12 hours]**
Data Visualization: Basic principles, ideas and tools for data visualization	
Data Science and Ethical Issues: Discussions on privacy, security, ethics	

Method of delivery

Chalk and Board, Presentations, Inverse Classroom, AV(Reference Videos), self study material, Practical Demo

Study time

Theory- 3 Hours, Practical- 2 Hours

CO-PO Mapping (PO: Program Outcomes)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1	2	-	-	-	-	-	-	-	-	-
CO 2	1	2	3	-	2	-	-	-	-	-	-	-
CO 3	1	2	3	-	2	-	-	-	-	-	-	-
CO 4	-	3	2	-	2	-	-	-	-	-	-	-
CO 5	-	2	2	-	3	-	-	-	-	-	-	-
CO 6	-	2	2	1	3	-	-	-	2	2	1	-

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

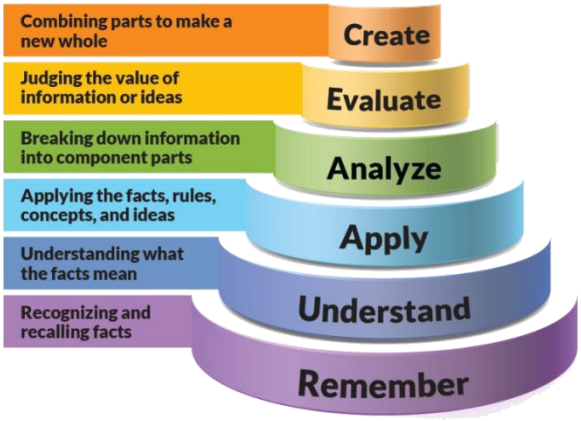


Figure 1: Blooms Taxonomy

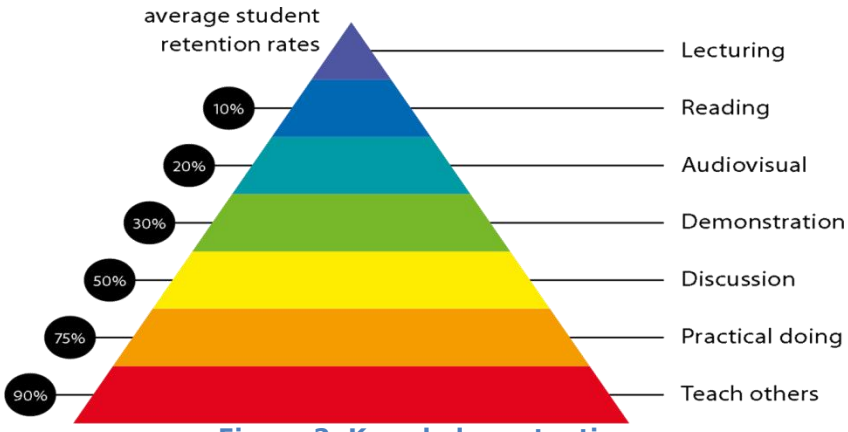


Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of Graduate Capabilities
Informed Have a sound knowledge of an area	**1 Professional knowledge, grounding & awareness**

of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

No.	Practical
1.	Introduction to R tool for data analytics science:
2.	Descriptive statistics in R
3.	Reading and writing different types of datasets
4.	Visualizations
5.	Correlation and covariance

6.	Regression model
7.	Multiple regression model
8.	Regression model for prediction
9.	Classification model
10.	Clustering model
11.	Getting started with jupyter notebooks/google collaborator
12.	Libraries: NumPy, ScikitLearn, Pandas,Matplotlib
13.	Clustering and classification
14.	Decision Tree and Random Forest
15.	Neural Networks
16.	Data analysis and visualization with python
17.	Advanced Exercises: Digit Classification Regression Models Prediction of Airbnb Renting Price

Lecture/tutorial times

(Give lecture times in the format below)

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be used in written work

Text books

1. Data Science from Scratch, Steven Cooper, 2018
2. Introduction to Data Science, Laura Igual, Santi segui, Springer, 2017.
3. Applied statistics and probability for engineers, Montgomery, Douglas C., George C. Runger, John Wiley & Sons, 2010
4. Doing Data Science, Straight Talk From The Frontline., Cathy O'Neil and Rachel Schutt , O'Reilly. 2014

Additional Materials

1. Machine Learning: A Probabilistic Perspective. Kevin P. Murphy.
2. Mining of Massive Datasets , Anand Rajaraman and Jeffrey David Ullman 2012

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE (60 Marks)
- **Mid Semester Exam- 40 Marks**
- **Internal Evaluation- 20 Marks**
  - **Case study – 10 Marks**
  - **Presentation – 5 Marks**
  - **Attendance – 5 Marks**

ESE (40 Marks)

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

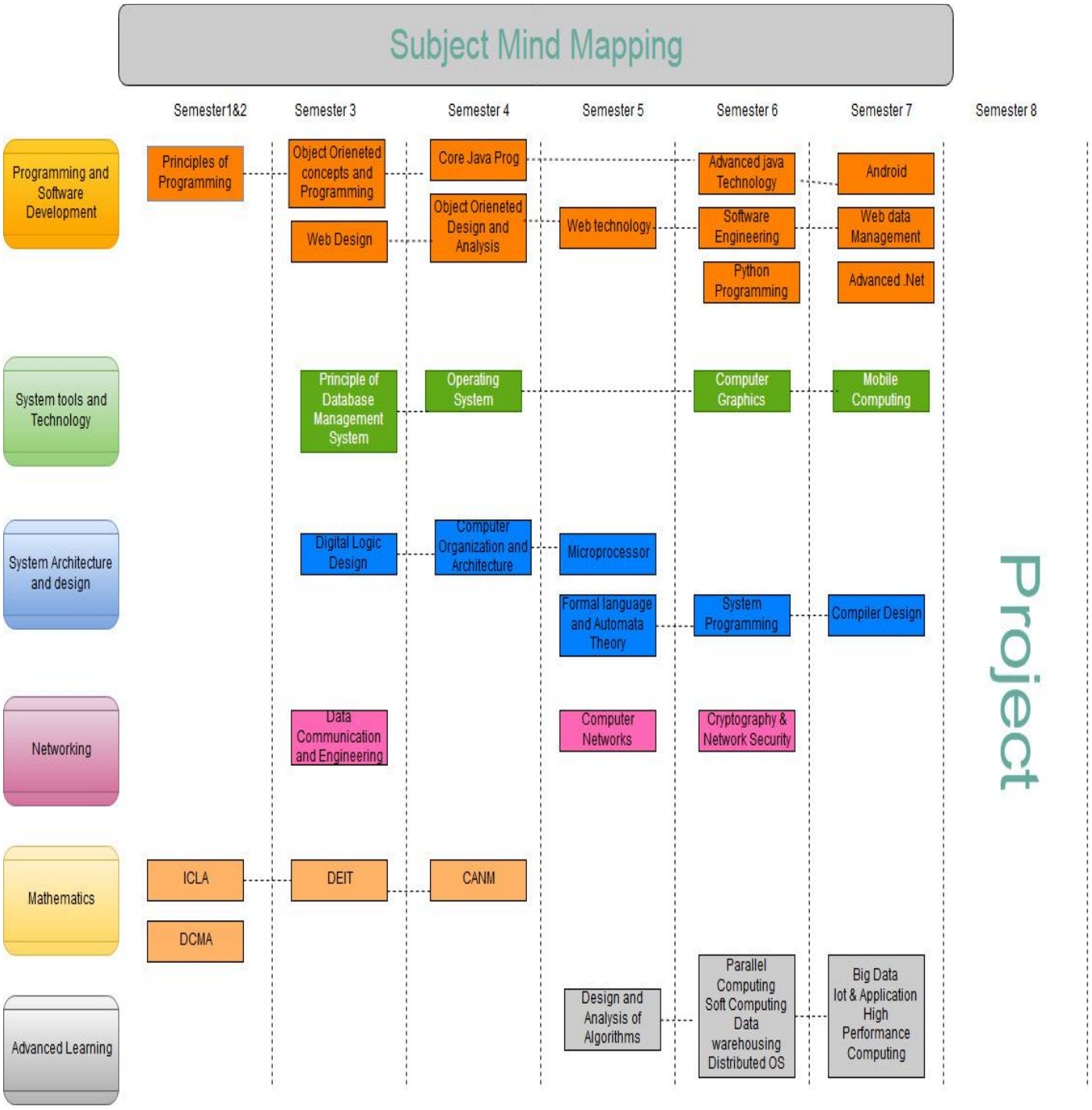
Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment

Course schedule (subject to change)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Week 1	Defining Data Science , What do data science people do?, Current landscape of perspectives,	CO1, CO2	Presentations
	Week 2	Data Science in Business, Use Cases for Data Science	CO1, CO6	Inverse Classroom (case Study)
	Week 3	Statistical modeling, probability distributions, fitting a model	CO3, CO6	AV, Presentations, Chalk and Board
	Week 4	Intro to R and Python, Python Libraries	CO5, CO6	Self Study Materials
	Week 5	Introduction to the course, Descriptive Statistics, Probability Distributions	CO3, CO6	Presentations, Chalk and Board
	Week 6	Inferential Statistics through hypothesis tests, Permutation & Randomization Test	CO6	Presentations, Chalk and Board
	Week 7	Differentiating algorithmic and model based frameworks, Regression: Ordinary Least	CO5, CO6	Practical Demo, AV, Presentations

		Squares, Ridge Regression, Lasso Regression		
	Week 8	K Nearest Neighbors, Regression & Classification	CO3, CO5	Practical Demo, Presentations,
	Week 9	Bias-Variance Dichotomy, Model Validation Approaches, Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis	CO1, CO3	Practical Demo, AV, Presentations,
	Week 10	Regression and Classification Trees, Support Vector Machines, Ensemble Methods: Random Forest, Neural Networks, Deep learning	CO3, CO5	Practical Demo, AV, Presentations,
	Week 11	Clustering, Associative Rule Mining, Logical Modelling : Converting a conceptual model to logical model , Integrity constraints, Normalization	CO3, CO5	Practical Demo, Presentation
	Week 12	Basic principles, ideas and tools for data visualization, Discussions on privacy, security, ethics	CO1, CO4	Practical Demo, AV, Presentations


Subject Mind Mapping
Semester1&2
Semester 3
Semester 4
Semester 5
Semester 6
Semester 7
Semester 8
Programming and Software Development
Principles of Programming
Object Orieneted concepts and Programming
Web Design
Core Java Prog
Object Orieneted Design and Analysis
Web technology
Advanced java Technology
Software Engineering
Python Programming
Android
Web data Management
Advanced .Net
System tools and Technology
Principle of Database Management System
Operating System
Computer Graphics
Mobile Computing
System Architecture and design
Digital Logic Design
Computer Organization and Architecture
Microprocessor
Formal language and Automata Theory
System Programming
Compiler Design
Networking
Data Communication and Engineering
Computer Networks
Cryptography & Network Security
Mathematics
ICLA
DCMA
DEIT
CANM
Advanced Learning
Design and Analysis of Algorithms
Parallel Computing Soft Computing Data warehousing Distributed OS
Big Data Iot & Application High Performance Computing
Project

Name of Institute: Indus Institute of Technology & Engineering
Name of Faculty: Vaidehi Patel

Course code:
Course name: Advanced Java Technology

Pre-requisites: Basic knowledge of Java Programming
Credit points: 3
Offered Semester: VII

Course coordinator
Full name: Vaidehi Patel
Department with siting location:
Telephone: +91 9662017929
Email: vaidehipatel.ce@indusuni.ac.in
Consultation times:

Course lecturer
Full name: Vaidehi Patel
Department with siting location:
Telephone: +91 9662017929
Email: vaidehipatel.ce@indusuni.ac.in
Consultation times:

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

By participating in and understanding all facets of this Course a student will:

1) Design and develop the basic application programs.
2) Describe, identify and debug issues related to the development of application.
3) Create a customized control application with different UI components
4) Design and develop the database needed for the storing data of application.
5) Understand the different states of mobile application.

Course Outcomes (CO)

By participating in and understanding all facets of this course a student will be able to:.

1. To provide and enrich students with knowledge of Enterprise Java standards and architectures.
2. Students can develop programming ability to build dynamic application using Servlet and JSP with Database Connection
3. Students can learn various concepts based on network programming using protocols.
4. Design and develop application using frameworks like as Hibernate, Spring etc

Course Outline

UNIT-I
[12]

Introduction to J2EE and Overview of Web Development:
Concept of Java Technology, J2EE Architectures, Java EE Components and Containers, Types of Servers in J2EE Application. Concept of HTTP Protocols and API, Request Processing in Web Application, Web Application Structure, Web Containers, and Web based MVC architecture.

JDBC:
Introduction to JDBC, Architecture of JDBC, JDBC driver types,steps for connecting to JDBC, Types of Statements in JDBC (Statement Interface, PreparedStatement, CallableStatement), Types of ResultSet, Executing SQL Queries, MetaData, JDBC Exception, Transaction Managemen

UNIT-II

Servlet API:
Introduction to Servlet, Life Cycle of Servlet,HTTP Methods Structure and Deployment descriptor, ServletContext and ServletConfig Object, Request and Response objects,Servlet, Collaboration, Servlet Annotations, Session Tracking, Filters API, Connecting Servlet API to JDBC.

JSP:
Introduction to JSP, Compare JSP with Servlet, JSP page life cycle, JSP architecture, JSP elements, JSP Implicit Objects, Expression Language, JSP Standard Tag Libraries,JSP Custom Tag, JSP Session Management, JSP Exception Handling, JSTL, JSP CRUD Application.

UNIT-III
[12]

Network Programming:
Basic of Network Programming, Introduction of Socket, Types of Socket, Socket API, TCP/IP client sockets, java.net package Socket, Datagram's, URL, TCP/IP server sockets, RMI Architecture, Client Server application using RMI.

Java Mail:
Introduction, Protocols used in Java Mail, Architecture of Java Mail, Sending and Receiving Email.

UNIT-IV
[12]

Hibernate Framework:
Introduction, Architecture, Object Relational Mapping in Hibernate, Hibernate annotations.Hibernate Query Language.

Spring Framework:
Introduction, Spring Architecture, Spring MVC Module, Bean Life Cycle, Constructor Injection, Dependency Injection, Inner Beans, Aliases in Bean, Bean Scopes, Spring Annotation.Spring AOP Module, Spring DAO, Database Transaction Management, CRUD Operation using DAO and Spring API

Method of delivery
Chalk and Board, PowerPoint presentation, demonstration of devices.

Study time
2 hrs theory, 2 hrs practical

CO-PO Mapping (PO: Program Outcomes)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO 1	3	3	2	1	2	-	-	-	1	-	-	-
CO 2	3	3	1	-	2	-	-	-	1	-	-	-
CO 3	3	2	1	-	2	-	-	-	1	-	-	-

Blooms Taxonomy and Knowledge retention (For reference)
(Blooms taxonomy has been given for reference)

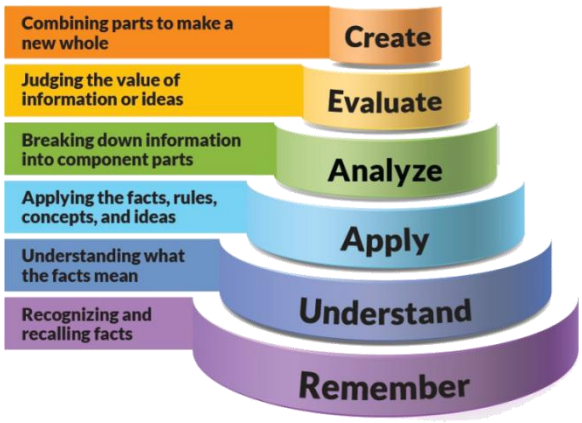


Figure 1: Blooms Taxonomy

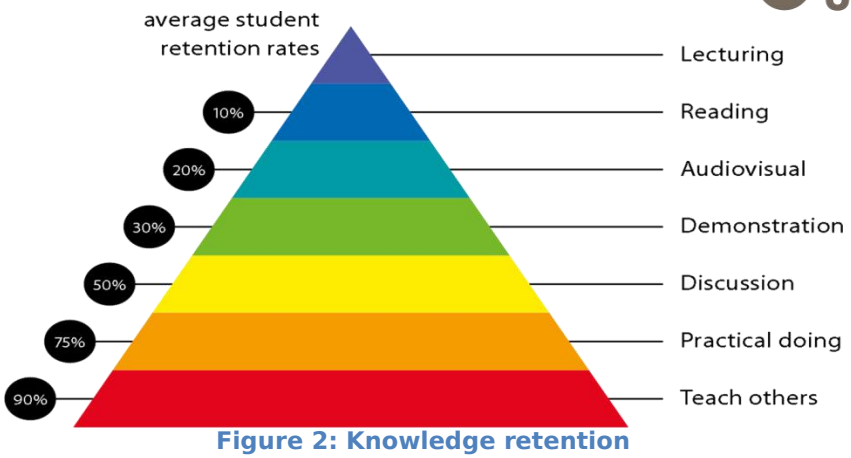


Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**

Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

Lecture/tutorial times

No.	Title
1.1	Understand J2EE architecture and Database Connection.
1.2	Write down basic steps to establish database connection from java. Also write the connection code for different db.
1.3	User can create a new database and also create new table under that database. Once database has been created then user can perform database operation by calling above functions. Use following Java Statement interface to implement program: 1. Statement 2. Prepared statement 3. Callable statement
1.4	Write a JDBC application which will perform CRUD operation on student table.
1.5	Write JDBC application to display record from database using metadata.
2.1	Create web application for servlet and study web descriptor file.
2.2	Write a servlet code which perform servlet context and servlet config object.
2.3.	Implement login form and perform session management using different methods.
2.4	Develop a web application for bank system which performs the following task. 1. Create database and master table for bank 2. Perform insert, update and delete operation. 3. Validate the attributes.
2.5	Write down the program for testing the include action and forward action for servlet collaboration.
2.6	Write down servletfile in which error is handled by the deployment descriptor file (web.xml).
3.1	Write down the Program for testing the include and forward action tag in jsp.
3.2	Write down the program in which input the one numbers in an html file and then displaythe number is prime or not in JSP file.
3.3	Create database of student subject-wise data and retrieve all data using JSP and generatexml structure along with DTD and XML Schema definition
3.4	Write down a program which demonstrates the core tag of JSTL.

4.1	Implement chat application using TCP
4.2	Write RMI application where client supplies two numbers and server response by addition it. Provide your custom security policy for this application.
4.3	Implement Student information system using JDBC and RMI.
4.4	Write down a program of sending email using Java Mail API.
4.5	Write down a program of receiving email using Java Mail API.
5.1	Implement simple framework using hibernates and studies its architecture.
5.2	Study and implement hibernate annotation.
5.3	Use Hibernate Query Language to insert, update and delete records in database.

(Give lecture times in the format below)

Lecture **Lecture/Tutorial** **Practicals**

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Reference Books:

Text Books:
1) Java 6 Programming, Black Book, dreamtech
2) Java Server Programming, Java EE6 (J2EE 1.7/1.8), Black Book, dreamtech
3) Java Programming Advance Topics, Joe Wigglesworth and Paula McMillan,Cengage

Reference Books:
1) Core Java, Volume II – Advanced Features, Eight Edition, Pearson
2) The Complete Reference J2EE, Keogh, McGrawHill
3) Java EE 5 for beginners, Bayross and Shah, SPD
4) JDBC 3 Java Database Connectivity, Bernand Van Haecke, Wiley-dreamtech
5) Java Server Pages for Beginners, Bayross and Shah, SPD
6) Java Servlet Programming, Jason Hunter, SPD (O'Reilly)
7) Spring in Action 3rd edition , Craig walls, Manning Publication
8) Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication

Additional Materials

1) http://courses.coreservlets.scom/Course-Materials/csajsp2.html

2) https://javabrains.io/topics/hibernate

3) https://www.javatpoint.com/spring-tutorial

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE-Theory (60 Marks) **Attendance: 10 Marks** **Assignments: 10 Marks** **Test: 40** **Viva: 10 Marks**	**CIE-Practical (60 Marks)** **Attendance: 10 Marks** **Mini Project: 20 Marks** **Practical File: 20 Marks** **Viva: 10 Marks**
ESE-Theory- 40 Marks	**ESE-Practical-40 Marks**
Total: 200 Marks	

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

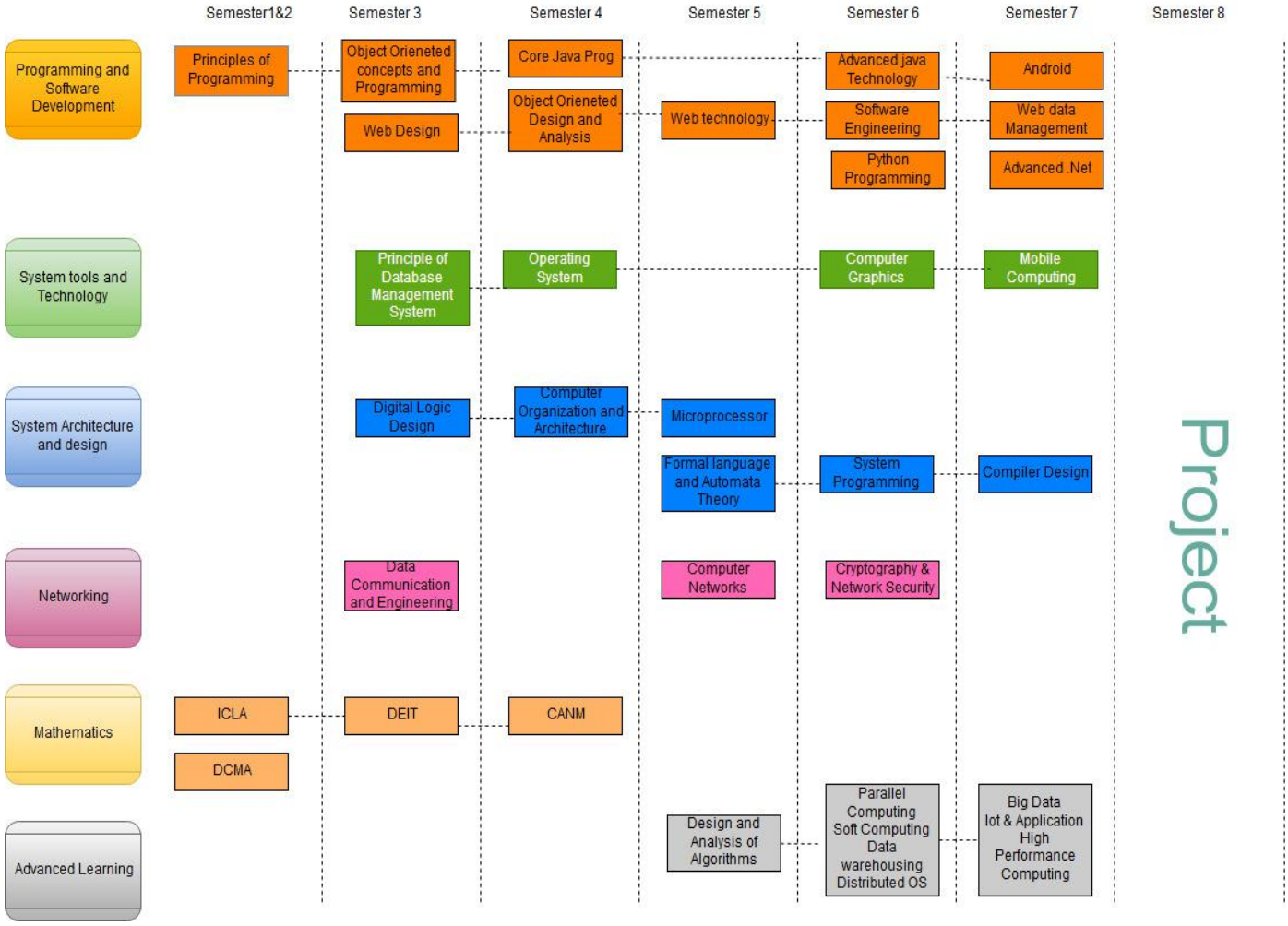
Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment.

Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

Subject Mind Mapping



Name of Institute: Indus Institute of Technology & Engineering

Name of Faculty: Ms. Roshni Patel

Course code:
Course name: Cryptography and Cyber Security [CE0624]
Pre-requisites: General ease with algorithms and elementary probability theory, maturity with mathematical proofs.
Credit points: 3
Offered Semester: VI

Course coordinator (weeks 01 - 15)
Full name: Ms. Roshni V Patel
Department with sitting location: Department of Computer Engineering (4^{th} Floor Faculty Room, Bhanvar Building)
Email: roshnipatel.ce@indusuni.ac.in
Consultation time: **3**.00 P.M. to 5.00 P.M. (Monday to Friday)

Course Lecturer (weeks 12)
Full Name: Dr. Nimisha Patel
Department with sitting location:2nd floor Bhanvar Building
Email: nimishapatel.ce@indusuni.ac.in
Consultation times: **3**.00 P.M. to 5.00 P.M. (Monday to Friday)

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives
By participating in and understanding all facets of this course a student will:

1. To know the methods of conventional encryption.
2. To understand and be critically aware of security threats and the available security mechanisms for combating security breaches.
3. To Critically discuss and understand the concepts of authentication and authorization, intrusion detection and information security techniques.
4. To create awareness of cyber security issues and challenges in IT environment.
5. To develop awareness in taking precautions in protecting them from cybercrimes and fraudulent activities.

Course Outcomes (CO)

On successful completion of this subject content, the student should:

CO 1: Basics of Cryptography and Network Security.

CO 2: Illustrate various Public key cryptographic techniques.

CO 3: Evaluate the authentication and hash algorithms along with authentication applications.

CO 4: Summarize the intrusion detection and its solutions to overcome the attacks.

CO 5: To create awareness of cyber security issues and challenges in IT environment and also taking precautions in protecting them from cybercrimes and fraudulent activities.

CO 6: Describe different classes of attacks and to create the awareness of how to avoid becoming victims of cybercrimes.

Course Outline

Cryptographic algorithm, Hashing, authentication, authorization, Cyber Crime, Threats etc.

Method of delivery

1. Chalk & Talk
2. PPT presentation

Study time

Lectures: 3 hours
Practical : 0 hours
Total: 3 hours/week

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1. To assess the hardware and software aspects of computer systems.

PSO2. To analyze and develop difference packages working with specific hardware systems.

Program Outcomes (POs)

Engineering Graduates will be able to:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

CO-PO Mapping (PO: Program Outcomes)

Course Outcome	Program Outcomes											
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
C0 1	3	-	2	-	2	2	2	3	2	-	1	-
C0 2	2	1	3	-	-	-	3	-	1	3	-	-
C0 3	2	3	2	2	-	-	2	2	2	-	3	-
C0 4	2	3	3	-	2	-	-	-	2	-	2	-
C0 5	-	2	-	-	2	2	2	-	2	-	-	-
C0 6	-	-	-	-	2	3	2	-	-	-	-	-
CE0624	**2.25**	**2.25**	**2.5**	**2**	**2**	**2.3**	**2.2**	**2.5**	**1.8**	**3**	**2**	**0**

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

Figure 1: Blooms Taxonomy

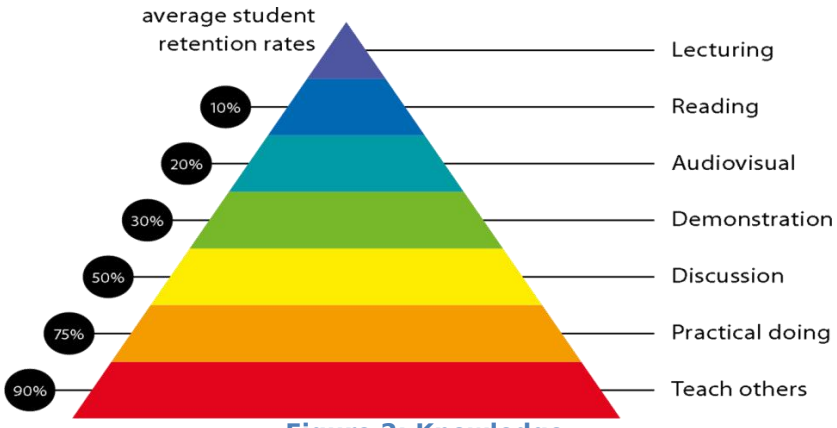
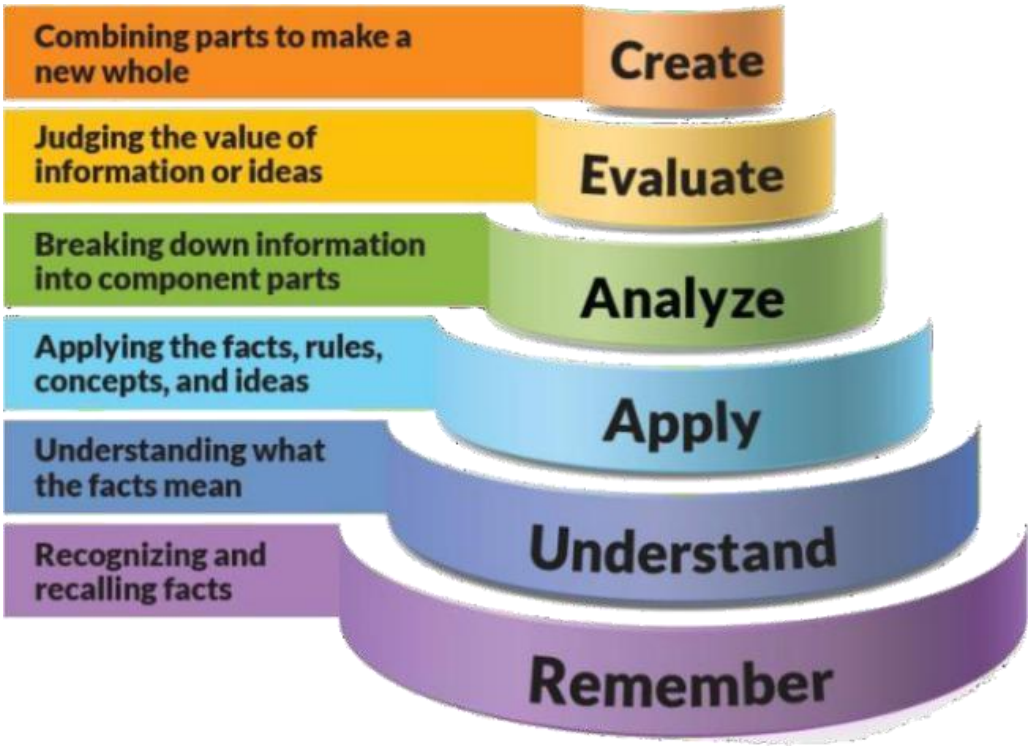


Figure 2: Knowledge retention



Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of Computer Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
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Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work: NIL

Lecture/tutorial times

Online Lectures (6th CS,IT)		
Day	**CS**	**IT**
Monday		2:00 pm
Tuesday	12:20 pm	
Wednesday	9:00 am	11:10 am
Thursday		11:10 am
Friday	11:10 am	

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Details of referencing system to be used in

written work Text books

1. William Stallings, "Cryptography And Network Security - Principles and Practices", Prentice Hall of India, Third Edition, 2003.
2. "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Nina Godbole, Sunit Belapur, Wiley India Publications, April,2011

Additional Materials

1) BehrouZ A. ForouZan. Tata McGraw-Hill Publishing Company Limited. NEW DELH ISBN 10: 1259064751 / ISBN 13: 9781259064753
2) Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
3) Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing – Prentice Hall of India.
4) Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
5) Johannes A. Buchmann, Introduction to Cryptography, Undergraduate Text in Mathematics, Springer.
6) A. Das and C. E. Veni Madhavan, Public-Key Cryptography: Theory and Practice, Pearson Education Asia.

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Marking Scheme

CIE	**60 Marks**
Mid semester Exam(Mar-2021)	40
Assignment:1	5
Assignment:2	5
Presentation/Quiz	5
Attendance>80%	5
ESE	**40 Marks**

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -10% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own
- if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)
.

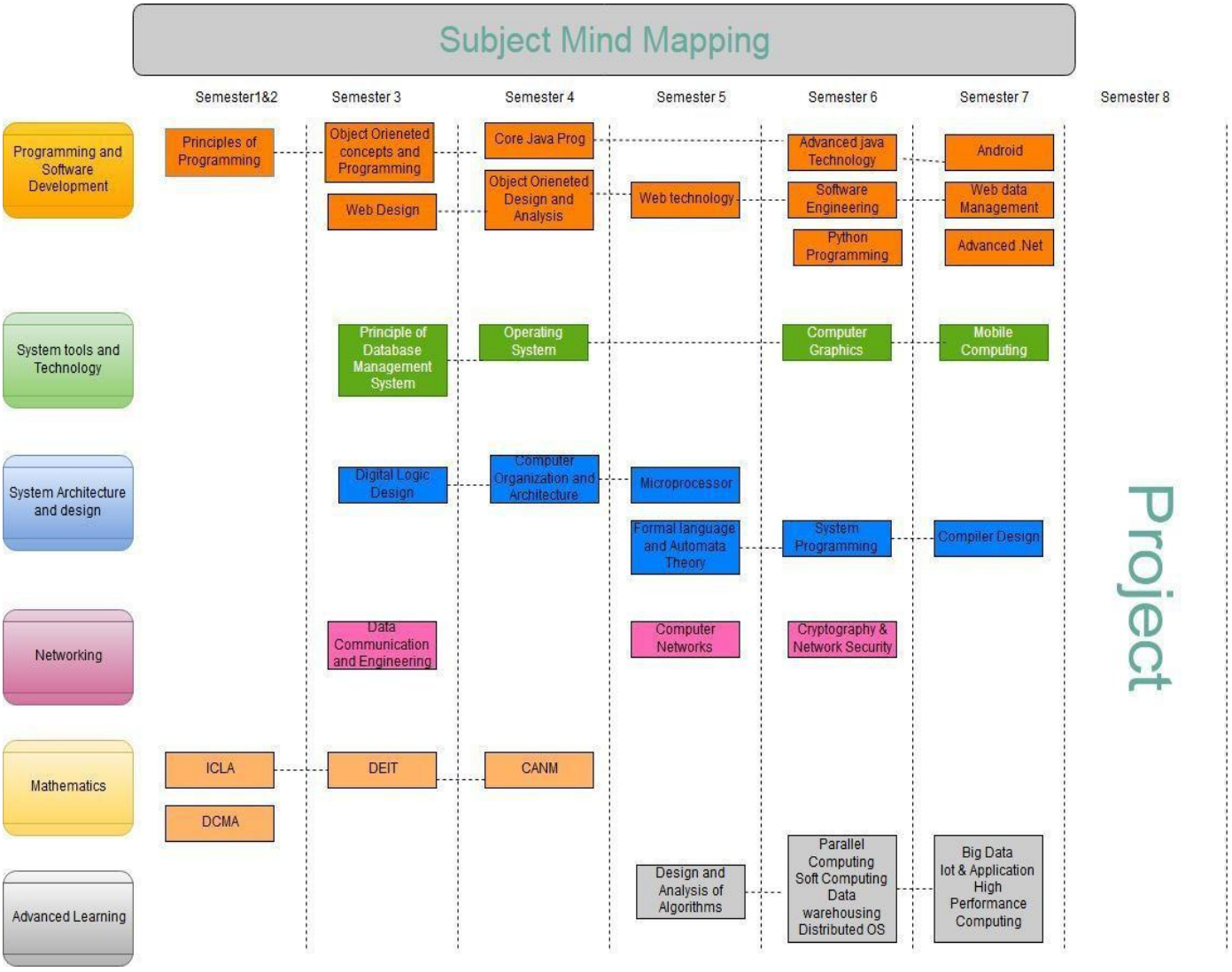
Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed
	Weeks 1	**Fundamentals:** Security Concepts: Introduction, The need for security, Principles of security, Introduction to security attacks - services and mechanism, the OSI security architecture	CO-1
	Weeks 2	A model for Network Security, Classical Encryption techniques, Cipher principles, cryptanalysis.	CO-1
	Week 3	**Blockciphers:** Block cipher design principles and modes of operation, Fiestel cipher structure, Overview on S-Box Design Principles, DES and its variants	CO-4
	Week 4	RC5, IDEA, Blowfish, Advanced Encryption Standard (AES) Algorithm.	CO-1

	Week 5	Public Key Cryptography: Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography	CO-2
	Week 6	Diffie-Hellman Key Exchange, Knapsack Algorithm, Key Management, KDC, Elliptic Curve Architecture and Cryptography.	CO-2
	Week 7	**Hash Function:** Message Authentication Codes, Hash Functions, Security of Hash Functions, MD5 message Digest algorithm, Secure Hash Algorithm	CO-3
	Week 8	RIPEMD, HMAC, Digital certificate. Digital Signatures,	CO-3
	Week 9	Authentication Protocols, Digital Signature Standards, Application Authentication Techniques Like Kerberos, X.509 Directory Authentication Services, PGP.	CO-3

	Week 10	Cyber security, Cyber security objectives and policies, Differences between Information Security & Cyber security, Cyber security Principles, Introduction of Cyber crime, Classifications of Cybercrimes	CO-5
	Week 11	Overview of Security threats, Hacking Techniques, Password Cracking, Insecure Network connections, Malicious Code, Programming Bugs, Application security (Database, E-mail and Internet), Data Security Considerations- Backups, Archival Storage and Disposal of Data	CO-5
	Week 12	**System Level Security:** Intrusion detection, Viruses and related Threats, Firewall Design Principles, Trusted Systems.	CO-6


Subject Mind Mapping
Semester1&2
Semester 3
Semester 4
Semester 5
Semester 6
Semester 7
Semester 8
Programming and Software Development
System tools and Technology
System Architecture and design
Networking
Mathematics
Advanced Learning
Principles of Programming
Object Orieneted concepts and Programming
Core Java Prog
Advanced java Technology
Android
Web Design
Object Orieneted Design and Analysis
Web technology
Software Engineering
Web data Management
Python Programming
Advanced .Net
Principle of Database Management System
Operating System
Computer Graphics
Mobile Computing
Digital Logic Design
Computer Organization and Architecture
Microprocessor
Formal language and Automata Theory
System Programming
Compiler Design
Data Communication and Engineering
Computer Networks
Cryptography & Network Security
ICLA
DCMA
DEIT
CANM
Design and Analysis of Algorithms
Parallel Computing
Soft Computing
Data warehousing
Distributed OS
Big Data
Iot & Application
High Performance Computing
Project

Name of Institute: Institute of Technology and Engineering
Name of Faculty: Asst. Prof Abhishek Vaghela

Course code: CE0622
Course name: IoT & Applications
Pre-requisites: Digital Electronics, Computer Architecture
Credit points: 4
Offered Semester: VI

Course coordinator (weeks 12)
Full name: Asst. Prof. Abhishek Vaghela
Department with siting location: EC Department, Signal Processing and Simulation Lab (Lab – 6)
Telephone: 3204
Email: abhishekvaghela.ec@indusuni.ac.in
Consultation times: Monday – Friday (4:00 PM to 4: 50 PM)

Course lecturer (weeks 12)
Full name: Asst. Prof. Abhishek Vaghela
Department with siting location: EC Department, Signal Processing and Simulation Lab (Lab – 6)
Telephone: 3204
Email: abhishekvaghela.ec@indusuni.ac.in
Consultation times: Monday – Friday (4:00 PM to 4: 50 PM)

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives
By participating in and understanding all facets of this course a student will:

1) Be able to explain the Principles of Internet of Things
2) Be able to Identify the Challenges and Research Scope in the Wireless Communication Protocols used in IoT Applications
3) Be able to employ IoT Solutions to Real Time Engineering Problems
4) Be familiar with the Data Management Techniques, Architectures and various key enablers to enable practical IoT systems

Course Outcomes (CO)

1. To ***learn*** about IoT and M2M Systems, IoT Architecture and tools
2. To ***analyze*** basic wireless communication Protocols used in IoT Applications
3. To ***identify*** the design, development and security challenges in IoT Systems
4. To ***study*** IoT Applications in Different Domains and be able to ***measure*** their performance
5. To ***implement*** basic IoT Applications on Embedded Platforms

Course Outline

This course aims has been offered with the aim of providing the students with in depth knowledge about Internet of Things. The curriculum includes details about Sensors, Actuators, Sensor Networks, IoT Concept, Network & Communication in Sensor Networks and IoT Applications.

Method of delivery

Face to face lectures, self study material, Active Learning Techniques, PowerPoint Presentation and Assignments

Study time

Lecture hours: 3 hours
Lab hours: 2 hours

CO-PO Mapping (PO: Program Outcomes)

Program Outcomes (POs)

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet

the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the program, the Computer Engineering student:

PSO1. Basics of Computer System: Should able to understand the principles and working of computer systems. Students can assess the hardware and software aspects of computer systems.

PSO2. Program Design: Design and develop computer programs in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics.

PSO3.Software Development: Should able to understand the structure and development methodologies of software systems with the use of a various programming languages and open source platforms.

	P	PO2	PO	PO	PO5	PO6	PO	PO8	PO	PO1	PO1	PO1	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	-	-	-	-	1	-	-	1	-	-
CO2	-	3	-	2	-	-	-	-	-	-	-	-	-	2	-
CO3	2	-	-	3	-	2	3	-	-	-	-	-	-	2	-
CO4	2	3	2	3	-	2	3	-	-	2	-	-	-	2	-
CO5	2	-	3	-	3	3	-	-	-	-	2	3	1	3	3

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

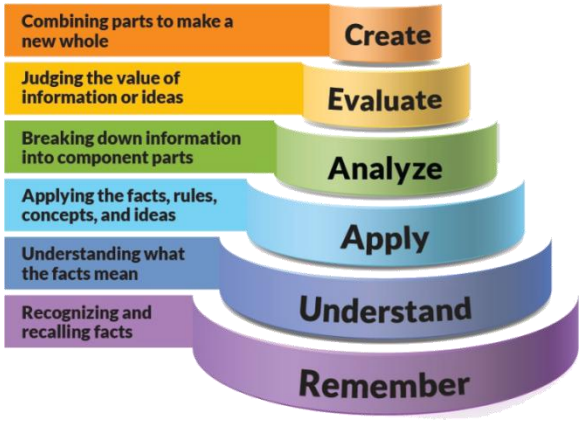


Figure 1: Blooms Taxonomy

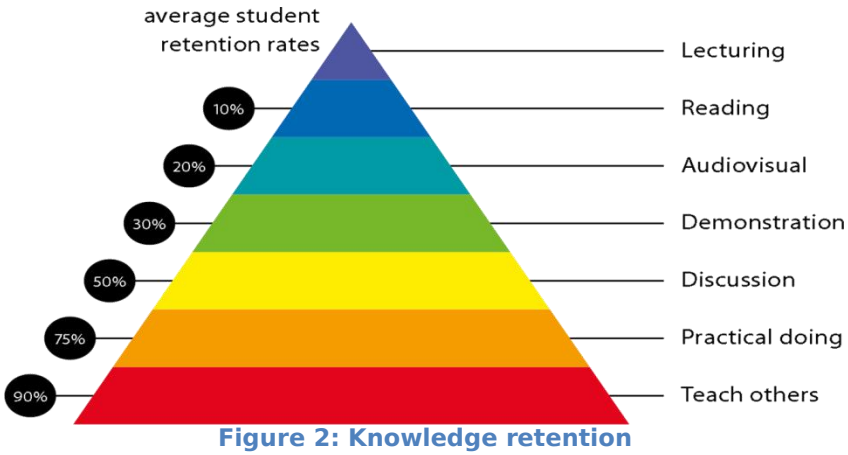


Figure 2: Knowledge retention

Practical work:

	Lab Number	Practical	CO Addressed
	1	**Study of Arduino development board**	3
	2	**Study of IoT protocols MQTT and CoAP**	2
	3	**Study of ESP8266 and NodeMCU development board**	1
	4	**Blink LED at a fixed interval with - Arduino, NodeMCU**	5
	5	**Interface analog sensor (temperature sensor LM35) with - Arduino and test simulation in Proteus, NodeMCU**	5
	6	**Configure ESP8266/NodeMCU in Station and in Access Point modes**	5
	7	**Develop offline Webserver to control GPIO: Demonstrate offline web server using HTML webpage which can be accessed from web browser and through which LED can be toggled**	5
	8	**Using IoT protocol: Demonstrate simple publish subscribe mechanism of MQTT protocol using MQTT protocol**	2, 5
	9	**Using IoT with NodeRED and Raspberry Pi: Implement a visitor counter which counts the visitors using motion (PIR) sensor and publishes the counts to an android phone using MQTT protocol. Interface PIR sensor with**	2, 5

		Raspberry Pi and implement the logic using Node RED	
	10	**Using IoT with NodeRED and Raspberry Pi: Implement a visitor counter which counts the visitors using motion (PIR) sensor and publishes the counts to an android phone using MQTT protocol. Interface PIR sensor with Raspberry Pi and implement the logic using Node RED**	2, 5

Lecture/tutorial times

(Give lecture times in the format below)

Example:

Lecture

Tuesday 12:20 PM to 01:20 PM
Wednesday 03:10 PM to 04:10 PM
Friday 11:10 PM to 12:10 PM

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Details of referencing system to be used in written work

Text books

1. Internet of Things Principles and Paradigms, Edited By Rajkumar Buyya, Amir Vahid Dastjerdi, Morgan Kaufmann, ELSEVIER

Reference books

1. Fundamentals of Wireless Sensors Networks Theory and Practice, Waltenegus Dargie and Christian Poellabauer, WILEY Series

2. Rethinking the Internet of Things A Scalable approach to connecting everything, Francis daCosta, Apress Open
3. Arduino Cookbook, Michael Margolis, O'REILLY
4. Internet of Things - From Research and Innovation to Market Deployment, Edited By Ovidiu Vermesan and Peter Friess, River Publishers

Additional Materials

1. NPTEL- Lecture
   https://nptel.ac.in/courses/106105166/

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Example:	
Attendance	5%
Quiz I	5%
Assignment	**5%**
Assignment	**5%**
Mid semester	40%
Final exam (*closed book*)	40%

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

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Do not share your work with other students (except where required for a group activity or assessment)

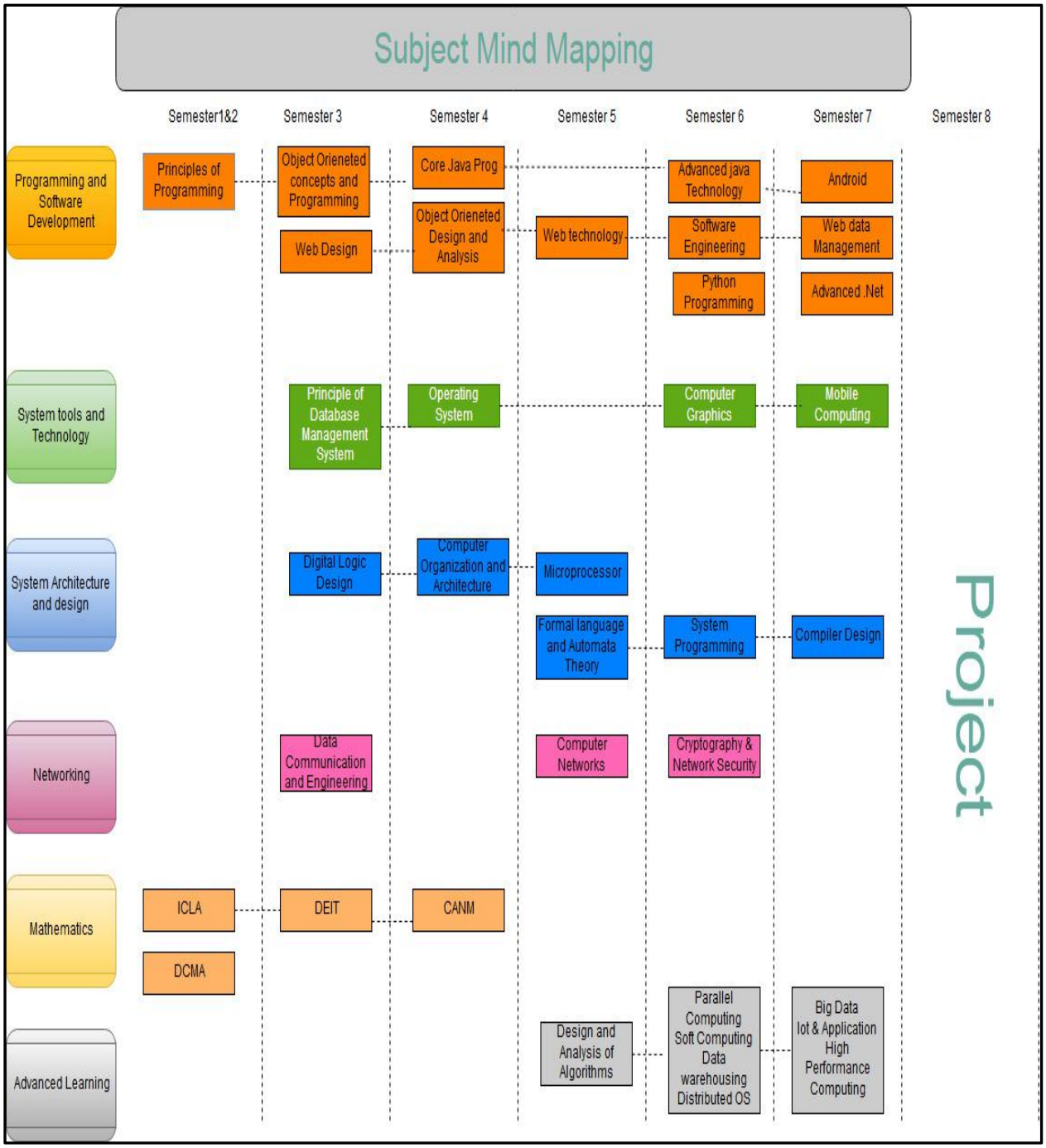
.

Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, Machine to Machine, IoT versus Machine to Machine	1	PPT, Assignment
	Weeks 2	Challenges in IoT: Design challenges, Development challenges, Security challenges;	1, 3	PPT, Assignment,
	Week 3	Application of IoT: Home automation, Industry applications, Surveillance applications	4	PPT, Assignment,
	Week 4	Wireless medium access issues, MAC protocol survey, Survey routing protocols	2	PPT, Assignment,
	Week 5	Sensor deployment & Node discovery	2	Quiz, Assignment
	Week 6	Data Aggregation & Dissemination	2	PPT, Assignment,
	Week 7	Introduction, OpenIoT Architecture for IoT/Cloud Convergence	1,3,4	PPT, Assignment,
	Week 8	Scheduling Process and IoT Service Lifecycle	1, 3	PPT, Assignment,
	Week 9	Scheduling and Resource Management, Device/Cloud Collaboration Framework	1, 3, 4	PPT, Assignment,
	Week 10	Applications of Device/Cloud Collaboration	2, 3, 4	PPT, Assignment,

	Week 11	Message Passing in Devices, Survey of IoT Programming Framework, Virtualization and Real Time	3, 4	Quiz, Assignment
	Week 12	Stream Processing in the System Architecture of IoT, Continuous Logic Processing System, Challenges in Stream Processing	3, 4	Case Study


Subject Mind Mapping
Semester1&2
Semester 3
Semester 4
Semester 5
Semester 6
Semester 7
Semester 8
Programming and Software Development
Principles of Programming
Object Orieneted concepts and Programming
Web Design
Core Java Prog
Object Orieneted Design and Analysis
Web technology
Advanced java Technology
Software Engineering
Python Programming
Android
Web data Management
Advanced .Net
System tools and Technology
Principle of Database Management System
Operating System
Computer Graphics
Mobile Computing
System Architecture and design
Digital Logic Design
Computer Organization and Architecture
Microprocessor
Formal language and Automata Theory
System Programming
Compiler Design
Networking
Data Communication and Engineering
Computer Networks
Cryptography & Network Security
Mathematics
ICLA
DCMA
DEIT
CANM
Advanced Learning
Design and Analysis of Algorithms
Parallel Computing Soft Computing Data warehousing Distributed OS
Big Data Iot & Application High Performance Computing
Project

Name of Institute: Indus Institute of Technology & Engineering
Name of Faculty: Zalak Trivedi

Course code: CE0620/CS0620/IT0620
Course name: Advance Python Programming

Pre-requisites: -
Knowledge of Object Oriented language will be useful.

Credit points: 4
Offered Semester: VI

Course coordinator
Full name: Zalak Trivedi
Department with sitting location: CE dept, 4th floor Bhanwar Building.
Telephone: -
Email: zalaktrivedi.ce@indusuni.ac.in
Consultation times:
Monday 11.55am to 2:00pm
Friday 01.30pm to 2.30pm

Course lecturer
Full name: Zalak Trivedi
Department with sitting location: CE dept, 4th floor Bhanwar Building.
Telephone:
Email: zalaktrivedi.ce@indusuni.ac.in
Consultation times:
Monday 11.55am to 2:00pm
Friday 01.30pm to 2.30pm

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives:

1. To understand why Python is a useful language for developers.
2. To learn how to design and program Python applications.
3. To learn how to use lists, tuples, and dictionaries, indexing, slicing in Python programs.
4. To learn how to design object-oriented programs with Python classes.
5. To define the structure and components of a Python program.
6. To learn how to build and package Python modules for reusability.
7. To learn how to read and write files in Python.

Course Outcomes (CO)

After successful completion of the course:

1. Master the principles of object-oriented programming and the interplay of algorithms and data structures in well-written modular code.
2. Solve problems requiring the writing of well-documented programs in the Python language, including use of the logical constructs of that language.
3. Demonstrate significant experience with the Python program development environment.
4. Demonstrate a familiarity with major algorithms and data structures.
5. Use features like inheritance, encapsulation, and information hiding to develop programs for real life problems.
6. Demonstrate the use of advance features like multithreaded programming, security, GUI Programming, Basics of Frameworks.

Course Outline

UNIT-I	**[8 hours]**
The basic elements of python, Branching, looping, Strings and Input Iteration Functions, Scoping and Abstraction, Functions and scoping, Recursion, Global variables, Modules, Files.	
UNIT-II	**[8 hours]**
Structured Objects, Mutability and Higher-Order Functions , Strings, Tuples, Lists and Dictionaries , Lists and Mutability ,Functions as Objects , Classes and Object-Oriented Programming, Abstract Data Types and Classes, Encapsulation and Information Hiding, Simple Algorithms and Data structures	
UNIT-III	**[8 hours]**
Regular Expressions – REs and Python, Plotting using PyLab, Networking Multithreaded and Threads and Processes, Chat Application, Security – Encryption and Decryption, Classical Cyphers,	
UNIT-IV	**[8 hours]**
Graphics and GUI Programming – Drawing using Turtle, Tkinter and Python, Other GUIs, Introduction to frameworks: flask, tensor flow, Database connectivity: Introduction, Connections, Transactions, Handling error	

Method of delivery

Chalk and Board, PowerPoint presentation

Study time

3 hrs theory, 2 Hrs practical

CO-PO Mapping (PO: Program Outcomes)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO 1	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	1	1	-	-	-	-	-	-	-	-	-
CO 3	3	3	2	-	-	-	-	-	-	-	-	-
CO 4	2	1	-	-	-	-	-	-	-	-	-	-
CO 5	3	3	2	-	-	-	-	-	-	-	-	-
CO 6	3	3	2	-	-	-	-	-	-	-	-	-

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

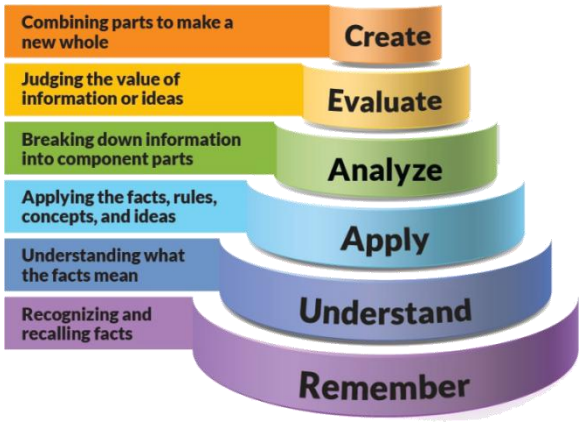


Figure 1: Blooms Taxonomy

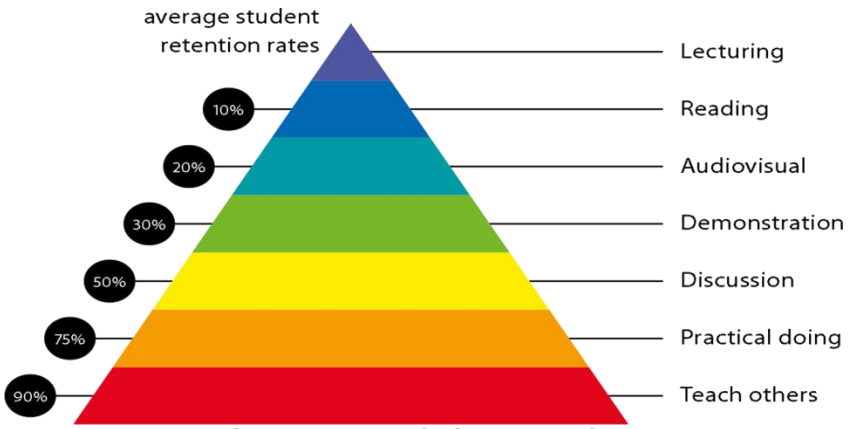


Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

1	**Develop programs to understand the control structures of python** Write a Python program to print the calendar of a given month and year. Write a Python program to calculate number of days between two dates. Write a Python program to check whether a specified value is contained in a group of values. *Test Data* : 3 -> [1, 5, 8, 3] : True -1 -> [1, 5, 8, 3] : False Write a Python program to get OS name, platform and release information.	Basic knowledge of python Programming
2	**Develop programs to learn different types of structures (list, dictionary, tuples) in python** Write a Python program which accepts a sequence of comma-separated numbers from user and generate a list and a tuple with those numbers. Write a Python program to display the first and last colors from the following list.[orange, purple, red,yellow,blue] Write a Python program to concatenate all elements in a list into a string and return it. Write a Python program to print out a set containing all the colors from color_list_1 which are not present in color_list_2. *Test Data* : color_list_1 = set(["White", "Black", "Red"]) color_list_2 = set(["Red", "Green"]) *Expected Output* : {'Black', 'White'}	Basic knowledge of strings and operation on strings in python.
3	Write a Python script to print a dictionary where the keys are numbers between 1 and 15 (both included) and the values are square of keys.	Basic knowledge of Dictionaries

	Sample Dictionary {1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64, 9: 81, 10: 100, 11: 121, 12: 144, 13: 169, 14: 196, 15: 225}	
4	Develop programs to learn concept of functions scoping, recursion and list mutability	Basic knowledge function
5	Develop programs to understand working of exception handling and assertions	Basic knowledge of exception and assertions
6	Develop programs for data structure algorithms using python – searching, sorting and hash tables	Basic knowledge of data structure
7	Develop programs to learn regular expressions using python	Basic principle of Regular Expressions
8	Develop chat room application using multithreading.	Basic knowledge of multithreading
9	Implement classical ciphers using python	Basic knowledge of encryption decryption.
10	Demonstration of Database Connectivity	Knowledge of database connectivity and basic framework

Lecture/Tutorial times

(Give lecture times in the format below)

Lecture	**Monday**
Lecture	**Tuesday**
Lecture	**Wednesday**
Practical (B1)	
Practical (B2)	

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Reference Books:

1. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of
India
2. R. Nageswara Rao, “Core Python Programming”, dreamtech
3. Wesley J. Chun. “Core Python Programming - Second Edition”, Prentice Hall
4. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Pyhon”, Wiley
5. Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication

6. Luke Sneeringer, “Professional Python”, Wrox
7. “Hacking Secret Ciphers with Python”, Al Sweigart, URL-https://inventwithpython.com/hacking/chapters

Online Courses:

https://www.youtube.com/watch?v=N4mEzFDjqtA
https://www.youtube.com/watch?v=hnxIRVZ0EyU
https://www.youtube.com/watch?v=tKTZoB2Vjuk

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE-Theory (60 Marks) **Class Regularity- 10 Marks** **Class Test- 40 Marks** **Quiz/Assignment:10 Marks**	**CIE-Practical (60 Marks)** **Class Regularity – 10 Marks** **Lab Performance/Submission-20 Marks** **Minor Project: 30 Marks**
ESE-Theory- 40 Marks	**ESE-Practical-40 Marks**
Total: 200 Marks	**Total: 200 Marks**

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

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Format

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Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment.

Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Week 1	The basic elements of python**:** Branching Programs, Control Structures	I	Chalk & Board, Discussion
	Week 2	Strings and Input Iteration	I	Presentation, Chalk & Board
	Week 3	Functions, Scoping and Abstraction: Functions and scoping , Specifications Recursion	I	Presentation, Chalk & Board
	Week 4	Global variables, Modules	II	Presentation, Chalk & Board
	Week 5	Files , System Functions and Parameters	II	Presentation, Chalk & Board
	Week 6	Structured Types, Mutability and Higher-Order Functions	II	Model presentation
	Week 7	Strings, Tuples, Lists and Dictionaries Lists and Mutability , Functions as Objects	II	Presentation, Chalk & Board,

				Demonstration
	Week 8	Classes and Object-Oriented Programming	II	Presentation, Chalk & Board, Demonstration
	Week 9	Abstract Data Types and Classes Inheritance Encapsulation and Information Hiding	*II*	Presentation, Chalk & Board
	Week 10	Simple Algorithms and Data structures Search Algorithms Sorting Algorithms Hash Tables	*II*	Presentation, Chalk & Board
	Week 11	Regular Expressions – REs and Python Plotting using PyLab Networking and Multithreaded Programming – Sockets, Threads and Processes, Chat Application	*III*	Presentation, Chalk & Board
	Week 12	Security – Encryption and Decryption , Classical Ciphers	III	Presentation, Chalk & Board
	Week 13	Graphics and GUI Programming – Drawing using Turtle, Tkinter and Python, Other GUIs	IV	Presentation, Chalk & Board
	Week 14	Introduction to frameworks: flask, tensor flow	IV	Presentation, Chalk & Board
	Week 15	Database connectivity: Introduction, Connections, Transactions, Handling error	IV	Presentation, Chalk & Board

Subject Mind Mapping